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THE 1807

DOMESTIC ENCYCLOPÆDIA;

OR, A

DICTIONARY OF FACTS,

AND

USEFUL KNOWLEDGE:

COMPREHENDING

A CONCISE VIEW OF THE LATEST DISCOVERIES,
INVENTIONS, AND IMPROVEMENTS, CHIEFLY
APPLICABLE TO RURAL AND DOMESTIC ECONOMY;

TOGETHER WITH

DESCRIPTIONS OF THE MOST INTERESTING OBJECTS OF NATURE AND ART;
THE HISTORY OF MEN AND ANIMALS, IN A STATE OF HEALTH OR
DISEASE; AND PRACTICAL HINTS RESPECTING THE ARTS AND
MANUFACTURES, BOTH FAMILIAR AND COMMERCIAL.

Illustrated with numerous Engravings and Cuts.

IN FOUR VOLUMES.

VOLUME FIRST.

BY

A. F. M. WILLICH, M. D.

AUTHOR OF THE LECTURES ON DIET AND REGIMEN, &C. &C.

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TO

THE KING.

SIR,

ANIMATED by the gracious approbation, with which YOUR MAJESTY was pleased to receive the outline of the present Work, the Editor was encouraged to solicit the Royal Sanction, and to avail himself of every resource, both native and foreign; with a view to render the *Domestic Encyclopædia* worthy of the attention, and patronage, it now claims from a beneficent Sovereign.

If the numerous useful Facts, contained in these volumes, have been carefully selected; if the various objects of Rural and Domestic Economy have been elucidated with new and interesting discoveries; if the Familiar and Commercial Arts have also been attended to, with sufficient precision; and, if the Natural History of Man, Animals, Vegetables, and Minerals, has been concisely stated, together with the economical purposes to which these objects are individually subservient—the Editor will not regret such deficiencies as may be discovered in the physiological articles occurring in this Work; because he could not, consistently, extend it beyond the prescribed limits.

May Your Majesty, therefore, continue under the tutelary auspices of Providence so favourably situated, in your public and domestic concerns, as to bestow occasionally a few moments of leisure on the perusal of those essential topics, on which the prosperity and happiness of your brave and loyal subjects principally depend:—Such is the unfeigned wish and prayer of

Your Majesty's

most dutiful

and most humble servant,

A. F. M. WILLICH.

James-Street, Covent-Garden,
May 1, 1802.

PREFACE.

AS the nature and practical tendency of the DOMESTIC ENCYCLOPÆDIA have, in some measure, been anticipated, partly in the prefixed Title-page, and partly in the foregoing Dedication, a few remarks on the *origin* and *composition* of this Work, will suffice to convince the indulgent Reader, that it has not been undertaken with a view merely to increase the number of voluminous works already extant, and of a similar complexion.

It has been generally supposed, that the rapid succession of Cyclopædias, and Encyclopædias, which have appeared within the last twenty years, and which often are more distinguished by their alluring title-pages than by their intrinsic merit, affords so many proofs of the progress of Science and Literature, as well as of the increasing spirit of inquiry. This conjecture, however, is extremely doubtful, if not totally unfounded.

When it is considered, that the Editors of these bulky Compilations have directed their chief attention to the *quantity* of materials, rather than to a critical selection of *facts*; that, with a few exceptions, such works have been conducted by persons better qualified to superintend a printing-office, or a bookseller's shop, than to arrange or explain the immense circle of the Sciences; and that the *auri sacra fames* has almost uniformly been the principal object of these Speculators, it will then be readily allowed, that *their* productions afford only negative advantages to the social world.

Farther, the plurality of Readers have conceived an opinion, that, by the possession of an Encyclopædia, or what is pre-eminently termed, "A Dictionary of the Arts and Sciences," their library, however deficient, at length becomes complete. But those who are only in a slight degree acquainted with the gradual, though daily, advancement both of the abstruse and practical Sciences, will not be disposed to harbour a notion alike contracted, and fraught with consequences highly detrimental to the acquisition of knowledge. Nay, it may with equal truth be asserted, that the *earlier* impressions of books, which have progressively received additions and improvements, will answer the purpose as well as the latest publications; because they are comparatively cheaper, and fill a similar space on the shelves.—Such arguments may satisfy the Antiquarian Collector, but they are inconsistent with the conviction of intelligent minds.

On the other hand, it cannot be denied, that many attempts have been made to supply the Public with works professedly commenced on a more economical plan; by abridging the labours of others. Without presuming to decide on their merits, we shall quote a passage occurring in the Preface to the illustrious JOHNSON'S Dictionary, when he compressed his bulky folios, or quartos, into an octavo form:—"For these purposes (says that energetic writer), many dictionaries have been written by different authors, and with different degrees of skill; but none of them have yet fallen into my hands, by which even the lowest expectations could be satisfied. Some of their authors wanted industry, and others literature: some knew not their own defects, and others were too idle to supply them."

In regard to the *composition*, and arrangement, of the DOMESTIC ENCYCLOPÆDIA, many circumstances might be pleaded, by way of apology, for occasional inaccuracies and omissions; but, in a Work, consisting chiefly of practical information, and containing, perhaps, a greater number of *useful facts* than have ever appeared in the compass of four moderate volumes, it is to be hoped, the discreet Reader will naturally be inclined to qualify his strictures, by a large share of candour and impartiality. Conformably to his original plan, the Editor has spared no pains, trouble, or expence, to render this *Economical Dictionary* as complete as the present advancement of Agriculture, Gardening, of the Familiar Arts and Manufactures, as well as the imperfect state of Medical Science, would respectively admit. Many subjects, indeed, might have been extended to greater length, and others considerably abridged, had these volumes been peculiarly calculated for the use of either town or country-readers. Such, however, was not his design; as the Work now submitted to the Public, includes almost every object, more or less connected with Rural, Domestic, and Animal Economy. Hence, the inquisitive Reader will find numerous experiments related, many hundreds of which have not hitherto been published in the English language. Thus, the Editor has availed himself of such resources as have enabled him to elicite substitutes for the most essential as well as the most expensive articles of consumption, or convenience; for instance, those of Bread, Beer, Spirits, Wine, &c.

To facilitate the mode of consulting this Work, a Table of Contents, and an Index to the corresponding Synonyms, or inversions of terms, have been prefixed to each volume; though a few provincial or vernacular names, which are now obsolete, have purposely been omitted, in order to avoid unnecessary repetition:—for such references as have accidentally been overlooked in the body of the alphabet, where no explanation should appear on the subject, the Reader is requested to resort to the Supplement, commencing p. 387 of the Fourth Volume.

It will not, however, be expected that the Editor should be responsible for the accuracy of the result of those Experiments, which he has faithfully reported on the authority of others, whose names have been quoted on almost every occasion; but, in various instances where no vouchers have been adduced, the facts are either self-evident, or the account of the subject is given with a degree of diffidence, to induce attentive readers to farther investigation.

Although the Editor has, in the commencement of this arduous task, inserted the Latin names of subjects in alphabetical order, and referred thence to the appropriate English terms; yet, as such troublesome method promised no real advantage, he was induced to relinquish it, and to subjoin to the Fourth Volume a complete *Index to the Latin Names of Plants, Animals, Minerals, Diseases, and other subjects occurring throughout this Work.*

Lastly, as numerous useful and valuable suggestions, connected with particular subjects, are scattered in different parts of this Alphabetical Manual, it has been deemed expedient to conclude with a *General Index of Reference*, both for Economical and Medical purposes; which is accordingly subjoined to the Fourth Volume: thus, the Reader will be enabled to find, at one view, whatever relates to the article under consideration; an advantage which few works of a similar nature afford, and which cannot fail to be attended with good effects.

"*Ne tabulis & picturis domum tuam circumda, sed temperantiam ipsam depinge. Illud enim alienum est, et oculorum modo jucunda præstigiatio: hoc vero indelibilis, æternusque domui ornatus existit.*"

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III. Bedstead for the Sick and Wounded, invented by Mr. Lambert, p. 212.

IV. Ice-boats, newly invented by Thomas Ritzler, of Hamburgh, p. 299.

V. One-horse-cart, invented by Lord Robert Seymour, p. 433.

VI. Mr. C. Harland's Churn, and Mr. W. Bowler's Improved Churn, p. 525.

ERRATA ET CORRIGENDA.

Page 5, Col. 1, line 22, for were, read, was.
—— 27, —— 1, —— 4, after *Betula*, add, *alnus*.
—— 29, —— 1, —— 45, for SALOP, read, SALEP.
—— 31, —— 1, —— 25, after The, add, Red.
—— 40, —— 1, —— 26, for medial, read, medical.
—— 59, —— 1, —— 9, for BEATTIE, read, BATTIE.
—— 75, —— 2, —— 46, for *Indus*, read *Indicus*.
—— 76, —— 1, —— 1, for Spurg, read, Spurge.
—— 94, —— 1, —— 43, dele, *Arabis*, see CRESS.
—— 115, —— 1, —— 25, for ASSIMULATION, read ASSIMILATION.
—— 130, —— 2, —— 5, for *scolopendrum*, read, *scolopendrium*.
—— 136, —— 1, —— 20 and 21, dele, see DIVINATION, and NECROMANCY.
—— 137, —— 1, —— 43, for CLAIRULT, read, CLAIRAULT.
—— 143, —— 1, —— 45, for BREWING, read, BEER.
—— 146, —— 2, —— 4, for obtaining, read, curing.
—— 161, —— 1, —— 32, for GOLDEN FISH, read, GOLD-FISH.
—— 162, —— 2, —— 33, for GLASS-WRECK, read, GRASS-WRACK.
—— 178, —— 2, —— 16, after latter, add, are.
—— 202, —— 1, —— 34, after *Vicia*, add, *faba*.
—— 236, —— 1, —— 45, read Viper-broth.
—— 239, —— 2, —— 3, for *hederaca*, read, *hederacea*.
—— 257, —— 2, —— 31, after BILL, add, or Note of Hand.
—— 290, —— 2, —— 17, for, by these, read, these, by &c.
—— 293, —— 1, —— 32, dele *Dragon's Blood*, see DRAGON.
—— 299, —— 1, —— 44 and 45, for implements of restoration from DROWNING, read, Instruments for recovering the drowned.
—— 303, —— 1, —— 13, for last, read, 1800.
—— 321, —— 1, —— 2, for Lenetive, read, Lenitive.
—— *ib.* —— *ib.* —— 4, for rosin, read, resin.
—— 332, —— 2, —— 20, for Orage, read, Orache.
—— 335, —— 2, —— 45, for yellow, read, pale.
—— 337, —— 2, —— 41, read, art of breeding, &c.
—— 370, —— 1, —— 46, read, Wild-vine.
—— 377, —— 1, —— 14, read, the rind soon cracks.
—— *ib.* —— 2, —— 22, read, of this volume.
—— 387, —— 1, —— 33, for end, read, ends.
—— 427, —— 2, —— 39, read, *canariensis*.
—— 494, —— 2, —— 6, for cartaligenous, read, cartilaginous.
—— 509, —— 1, —— 6, for fifteen, read, thirty.

THE

THE

DOMESTIC ENCYCLOPÆDIA.

ABDOMEN, or the lower belly, is one of the most important regions of the human body, not only on account of its various contents, but also from its exposed situation.

Although, to give a strictly anatomical description of the different parts composing the admirable fabric of the animal frame, is not consistent with the plan of this work, yet, where the welfare and safety of the body are essentially concerned, we propose to add a distinct explanation of the organs liable to injury, and occasionally to point out their proper management in a healthy state, together with a few hints for treating complaints, the source of which is frequently not suspected.

The abdomen extends, longitudinally, from that cavity, or hollow, which is usually called the pit of the stomach, to the lower part of the trunk: it is defended, in front, by the abdominal muscles; behind, by the vertebræ of the back; and, on both sides, by the false ribs.

Instead of perplexing the reader with a minute account of the three regions, into which the lower belly is divided by anatomists, namely, the upper, or *epigastric*; the middle, or *umbilical*; and the lower, or *hypogastric* region; we shall rather proceed to examine their different contents.

In the first place, it deserves to be remarked, that the whole intestinal canal forms one continued tube, of greater or less capacity, beginning with the stomach, and terminating at the anus. This canal is, generally, six times the length of the whole human subject, in proportion to the person's stature, and is by Nature divided into two distinct parts; namely, the anterior, or uppermost, that is next to the stomach, comprising what are called the thin, or small intestines, which fill the middle, or fore parts, of the belly; and the posterior, or lowermost, where we find the large intestines occupying the sides, and both the upper and lower parts of that cavity. The former are again divided into the *duodenum*, or twelve-inch gut; the *jejunum*, or empty gut, and the *ileum*, or crooked gut; and the latter, or larger portion, into the *cœcum*, or blind gut; the *colon*, or hollow gut, being the largest of all the intestines; and the *rectum*, or the straight excretory gut, which terminates in the anus.

On opening the abdomen, we observe

serve its viscera and intestines in the following situation: after having removed the skin and the muscles, we discover the *peritoneum*, or a membrane which envelopes all the viscera of the lower belly. This being divided, the *omentum*, or cawl, appears floating on the surface of the intestines, which are likewise seen in a moist and loose state, making numerous windings through the whole cavity. The viscera next present themselves in this order: on the uppermost part of the belly, namely, under the midriff, towards the middle, but rather inclining to the right side, lies the liver, and near its concave surface is the gall-bladder; somewhat to the left is the stomach, and laterally, contiguous to it, the spleen. The kidneys are placed about the middle of the lumbar region, or the loins, while the urinary bladder, and the parts of generation, are situated in the lower division of the belly; in that bony cavity which is denominated the *pelvis*, or bason, and the sides of which form what are commonly called the hips.

The situation of these parts, however, in a natural state, frequently undergoes considerable variations, especially that of the liver, the stomach, and the spleen: and these deviations, being produced by various causes, as by a different posture of the whole body; distention of the stomach with an unusual quantity of food, either in a solid or liquid form; or, lastly, during pregnancy; hence it may be understood that, with every preternatural change of their respective positions, there may arise ruptures, spasmodic contractions, callosities, accumulations of water, called dropsy, and many similar complaints. To prevent such disastrous consequences, we cannot too strongly inculcate the necessity of observing strict temperance, particularly with respect to food, drink, and exercise. This proposition may be rendered more evident, by appealing to the experience of those Europeans, who have long resided in warm climates, and prudently restrained their sensual appetites; in consequence of which, they have seldom been attacked with diseases of the liver; an organ which cannot fail to become a prey to an irregular mode of living.

The intestines have certain general characters, though each of them manifests its peculiarities. In the former respect, we find that they are all connected with the vertebræ, by means of the mesentery; that each of them consists of different membranes, the innermost coat of which terminates in the intestinal canal itself, and forms semi-lunar valves, inclining towards each other, contracting the tube of that passage, and often appearing in several parts more numerous and conspicuous than in others. Each gut is, farther, provided with small glands, for the secretion of a viscid humour, and many small vessels for the absorption of certain fluids. Lastly, all intestines possess, in common, a certain creeping, called the peristaltic, or vermicular motion; which is occasioned by the contraction of their muscular fibres, operating in a spiral direction, or obliquely from the upper towards the lower parts; and they are thus liable to alternate contortions in their respective situations. This curious phenomenon may be clearly perceived for some time after death, and especially in an animal recently opened.

By inverting this motion of the stomach and bowels, an effect which may be produced by certain stimulating medicines, for instance, ipecacuanha, as well as by a local irritation of the fauces, it will be easily understood, that either nausea or vomiting will be the natural consequence, according to the different degrees of the stimulus applied.

The viscera of the abdomen are, in common with other parts of the body, liable to a variety of disorders; the most formidable of which, are those arising from inflammation.

An inflammation of the liver, hitherto supposed by the generality of physicians to be a very rare disease, has by a late French writer, M. Ferrein, been affirmed to be of all diseases the most frequent, and least understood. It often occasions other lasting and dangerous diseases; and, even when removed, unless proper precautions be observed, is liable to return. See the article Liver.

The usual symptoms of inflammations of the lower belly are, pain attended with fever; but these are by no means a *necessary* consequence; as in this, and other diseases of the Animal Economy, a slight degree of inflammation may prevail, unaccompanied either by febrile symptoms, or considerable pain. The mode of discovering the existence of inflammation is, to press with the tip of the finger on the seat of the complaint; and, if the viscera be inflamed, the pain will be increased in such manner, as when we touch a bruised or tender part. For the treatment of this dangerous affection, we must refer the reader the article Inflammation.

In order to protect the tender parts we have now described from *external* injury, every judicious person will admit the necessity of adopting such a dress as is best calculated to answer this useful purpose. Hence, no whalebone, or other stays tightly laced, should be worn by women, nor high and strait waistbands be suffered to impede the free action of the bowels, either in boys or men. It is indeed unreasonable to expect, that the present generation can enjoy the ease and comforts of their less fashionable, though more prudent forefathers, so long as mankind continue to encourage those customs and habits which almost every body deprecates, but which few have the resolution either to oppose or abandon.

Abies. See Fir-tree; or *Pinus Abies.* L.

ABLUTION, in its literal signification, implies washing, and is usually confined to purification by the aid of water; but may also be applied to cleansing, or washing with any other pure liquid. It is a term well known in the religious world. As a practice, its antiquity is co-eval with the first institution of religious ceremonies.

Ablutions were, on various occasions, enjoined by the Jewish Legislator. The Mahometans frequently have recourse to them in the celebration of those rites prescribed in the Alcoran; and they form no inconsiderable part in the established religion of almost every nation.

Egyptians, Grecians, Romans, Syrians, Cophts, Jews, Christians, &c. all admit them, as forming a part of their ceremonials; by total or partial immersion of the body, by sprinklings in baptism, and so forth.

But, though used in some measure symbolically, or as emblems of that inward purity requisite to the discharge of duty among the faithful disciples of religious institutions, yet the importance of ablutions is very considerable, when viewed in a physical sense, as being instrumental to preserve health and beauty, and not only to prevent, but in many cases to remove disease. See this subject under the articles Bathing and Washing.

ABORTION, or miscarriage, is, in modern times, justly considered as a misfortune; though the detestable and unnatural vice of procuring it by art, was connived at by the ancient Romans; whose disgraceful fall, as a nation, may in a great measure be attributed to their luxurious manners, and immoral habits.

As the history of this subject is rather disgusting than instructive, we shall proceed to state matters of a more useful tendency: we may, however, previously observe, that those enemies of human nature, who attempt to procure artificial abortion, generally experience either the punishment due to this outrage, by the fatal consequences which often destroy both mother and child, or not less frequently all the powers of art prove ineffectual, and the abandoned creature is tormented only with bitter remorse.

Weakly and irritable, hysterical, passionate, and especially voluptuous women of a plethoric habit, are most liable to miscarriage: though it may also happen from a general defective constitution, or rather from a malconformation of the sexual organs. The most frequent causes of abortion, however, are, the depressing passions, such as grief and fear; debility of the mother, especially if occasioned by great loss of blood; violent exercise of every kind, but particularly sudden stooping, and lifting weights; all diseases which agitate the whole frame, as fevers, convulsive fits, and coughing; as well as falls and blows on the abdomen; an indolent and irregular mode of living, whether too high, or on too poor sustenance; and sometimes even offensive smells.

The symptoms indicating abortion are, cold shiverings of short duration; nausea seldom accompanied with vomiting; pain about the loins, but more frequently in the abdomen, below the navel, and in the thighs; depression and softness of the breasts; palpitation of the limbs, and more especially of the heart; sinking of the lower belly; and a discharge, of various appearance, from the uterus.

One of the most general expedients adopted to prevent a miscarriage, has been periodical blood-letting, either from the arm or foot; which, in plethoric constitutions, has sometimes been carried to such excess, as to be repeated every month, during pregnancy. This practice, however, so prevalent in France and Germany, is hazardous, and liable to many strong objections; for, as abortions most generally occur in debilitated and nervous women, such losses of the vital fluid cannot but be attended with detrimental effects. According to the opinion of experienced practitioners, bleeding is advisable only in cases where particular circumstances concur to render such a diminution necessary, and even then, two small venæsections, from four to five ounces each, within the space of four or six days, are generally sufficient to obviate the most urgent symptoms.

The most effectual method of preventing such accidents, consists in a regular mode of life previous to pregnancy, occasionally aided by bracing remedies, such as the cold bath, moderate exercise on horseback or on foot, the use of mineral waters; in short, all those means which tend to counteract nervous and hysteric debility, or, in other words, which are proper for irritable habits. Yet the strictest observance of dietetic rules will not be attended with the desired effect, unless the person who is desirous of becoming a mother, have sufficient resolution to abstain from an immoderate indulgence in sensual pleasures. These, indeed, cannot be too much guarded against in a married state; as the contrary practice seldom fails to be attended with the most melancholy consequences. Hence we find, that, in certain families where temperance and prudence are strictly observed, a miscarriage is a rare event.

There are, however, cases in which mothers are constitutionally liable to abortion, and where the combined efforts of art and nature cannot prevent a misfortune, which not only in a remarkable degree debilitates the constitution, but has also a tendency to return on a future occasion. The most critical periods at which abortion may occur, are those of the third, fourth, and fifth months of pregnancy; though it may happen sooner or later. If, therefore, a woman be affected with a violent shooting pain in the back, extending to the uterus, together with the symptoms already described, it will be necessary, either to bleed her, if she be of a full and vigorous habit, or to adopt such a treatment as may be best calculated to obviate the portending danger. This consists in a very moderate, and chiefly liquid, nourishment, excluding whatever may rouse and irritate the system; and a calm and composed state of body and mind; so that to prevent a relapse of painful symptoms, she must sometimes keep her bed for several weeks or months together. Cataplasms applied to the pit of the stomach, and opiates, may occasionally become necessary; but the latter ought never to be resorted to, without proper medical advice; for there can be no doubt, that tampering with *laudanum*, or similar medicines, has often been productive of irreparable mischief. According to the uniform experience of professional men, however, the last-mentioned remedy may with more safety, and greater advantage, be employed in the form of clysters. Thus, we may confidently say, that an injection composed of six ounces, or a tea-cup full of cold chamomile-tea, and fifty drops of laudanum, every other night, or, according to circumstances, more or less frequently, has been attended with the happiest effects, especially if, in the intermediate days, when necessary, an emollient clyster were administered, with a view to relieve costiveness. We cannot, at the same time, too seriously deprecate the custom of tampering with laxatives taken by the mouth; a custom very prevalent among the vulgar, who are not aware of the injury thereby inflicted upon their disordered constitutions.

With respect to the concomitant affections of pregnancy, we must be very concise.—The pain in the head and tooth-ach, may, in general, be relieved by a cool regimen; an emollient diet, chiefly consisting of mucilaginous and subacid vegetables, such as fruit boiled in milk, artichokes, asparagus, parsnips, spinage, &c. aided by diluent drinks made of rice, barley, sago, the arrow-root, and similar vegetables; keeping the legs and feet sufficiently warm, and occasionally soaking them in tepid water; shaving the head, and washing it with diluted vinegar. If these simple means do not prove successful, bleeding with leeches on the temples, or even opening the jugular vein, will sometimes become necessary, especially in plethoric and bilious females. Beside these remedies, a blister applied to the neck behind the ears, or to the part most sensibly affected, is often of great service; though, in urgent cases, this application should cover the whole head. In full and robust habits, issues are eminently useful, while the bowels should be regularly opened by the mildest purgatives. Sometimes, however, the simple external application of a few drops of cajeput, juniper, or any other essential oil, operates like a charm, in removing either the tooth-ach, or violent pains of the head. In all the complaints of pregnant women, arising from too prevailing an acidity, such as heart-burn, vomiting, cough upon taking food, and that feverish, restless state, so common in the latter period of pregnancy, Dr. John Sims directs two or three spoonfuls of the following mixture to be taken, either occasionally, or, when the symptoms are continual, after every meal: viz. one drachm of calcined magnesia, five ounces and a half of pure water, three drachms of the spirit of cinnamon, and one drachm of the water of pure ammonia. Magnesia has long been a celebrated remedy for these complaints; but the most efficacious ingredient in the prescription, is the pure ammonia, as the effect will be nearly the same with the omission of the magnesia, which, without the ammonia, is of inferior efficacy. This judicious physician farther remarks, that the vomiting, which occurs *in early pregnancy*, seldom arises from, or is connected with, acidity; and that the remedy before specified is, in that case, not adapted to the purpose. When such vomiting is moderate, and confined to the early part of the day, it appears to be useful; but if it incessantly continue for many days together, accompanied with great loss of strength, constant thirst, and an utter inability of retaining any thing on the stomach, in this state Dr. Sims asserts, that the most effectual remedy is the application of leeches to the pit of the stomach; and a constant attention to diet, that the patient may swallow nothing which has a tendency to irritate or stimulate the organs of digestion. He has also found it of the greatest service to allow no other drink than ass's milk, and that by single spoonfuls only. The use of leeches, applied to the pit of the stomach, for the relief of vomiting, is by no means confined to the state of pregnancy; but when this symptom occurs in fevers, or is produced in consequence of taking any acrid or indigestible substance, he has repeatedly experienced that their application in those cases is of equal utility.

ABRAUM, in natural history, is a term given by some writers to a species of red clay found in the Isle of Wight, and used by our artizans to impart a fine red colour to new mahogany wood.

ABRIDGEMENT, is the art of compressing any species of literary composition, so as to convey its full and complete tenor in a smaller compass than the original.

The talent of abridging the labours of others, and of communicating much information in few words, is an act not only eminently useful in itself, but productive of great advantages. It enables the reader to take a concise and comprehensive view of those subjects, which, in a more diffuse form, his leisure or his inclination may not permit him to consult; while it exercises the mind of the writer in habits of close reasoning and accurate investigation. The attention which, in works of a complicated or extensive nature, is often distracted by brilliancy of style or variety of materials, is, by a short and faithful analysis, fixed to the merits of the subject, and to the truth of its contents. The chief end of abridging is rather to convey ideas, than multiply words, and to retrench superfluous expressions.

To offer any positive instructions for exercising this useful and valuable talent, is almost unnecessary; since taste, judgment, and critical discernment, are the safest guides. A few suggestions, however, may afford some illustration of the subject.

In attempting to give an analysis or abridgment of any particular production, it will be requisite to read it with proper attention; to examine the design of the author, and to discover the leading features and plan of the whole. Having perused and digested the work, it will be proper to transcribe only such parts as tend to convey definite ideas, or explain its immediate purpose; omitting all such remarks as are either inconsistent with, or inapplicable to, the subject.

In works of a more abstruse and comprehensive nature, it will be preferable to convey, as far as possible, the exact expressions of the author; but in those of a lighter description, such as works of imagination, public lectures, orations, essays, &c. it will be sufficient to give an outline of the substance; without directing the attention to the embellishments of style, or the structure of periods.

Abridgement is used also in a more circumscribed sense; to signify a short analysis of reference; by which, from a few abstracted particulars, we recur to any subject which has been either neglected or forgotten; and thus recall it to our recollection. This is particularly useful to those engaged in a variety of literary pursuits, as it preserves a free and unfettered application.

Works of history, in which the leading facts are merely detailed, are often happily abridged for the use of the student. See the article Memorandum.

ABSCESS is a soft, circumscribed tumor, containing matter, generally attended with fluctuation, and sometimes, though not always, with considerable pain. It is the consequence of some previous inflammation, and is often a critical effort of Nature to relieve the patient from superfluous or noxious humours, and to remove an acute disease.

The mode of treatment, to be adopted in the cure of an abscess, will be to assist its complete suppuration, and promote a free discharge of matter; for which purposes, all remedies that have a tendency to soften the skin, and encourage perspiration, are eminently useful. In languid habits, however, and where the suppuration proceeds but slowly, it will sometimes be necessary to open it either by caustic applications, or the lancet.

Warm fomentations, and emollient cataplasms made either with bread and milk, or oatmeal, renewed several times a day, are the usual poultices for an abscess. In large tumors, from which the discharge of matter has been considerable, and especially in those of the lower extremities, it will often be necessary to have recourse to such internal remedies as may strengthen and support the system. Bark, wine, and, if considerable pain or irritation prevails, opiates judiciously administered, will be highly beneficial.

After an abscess has been opened, it will require to be kept clean, and drest, either with dry lint, or some mild digestive ointment, once or twice a day, assisted by a compress and linen bandage.

Dr. Hartung, an ingenious physician at Erfurt, in Germany, has lately proposed a plan for the treatment of abscesses; which, for its simplicity and novelty, is worthy of attention. In their incipient stage, he recommends the frequent application of compresses moistened with simple *warm* water, and after the suppuration has entirely ceased, the same fluid applied in a *cold* state, in order to strengthen the surrounding parts.

Abscesses, which are formed on any of the more important organs of life, such as the brain, the lungs, liver, &c. are particularly to be dreaded; as, by bursting, and discharging their contents into the contiguous cavities, they frequently occasion instantaneous death. From neglect, or mismanagement, abscesses sometimes terminate in mortification, or Gangrene; which subject will be farther discussed under the head of Inflammation.

Absinthium vulgare. See *Artemisia Absinthium*, L. or Mugwort.

ABSTINENCE may be defined, the habit of refraining from what is either useful, agreeable, or pernicious; and may be divided into general and particular. In the former sense, it may signify a certain privation, whereby the senses are mortified, and the passions restrained. In the latter, it is confined to the exclusion of certain substances, at stated times and seasons, in compliance either with the customs of particular countries, or with religious precepts. There is, also, another sense, in which the term abstinence denotes the limitation of any usual indulgence, for the purpose of preserving health, and removing the consequences of excess.

In the religious institutions of all countries, we find many regulations on this subject. The Mosaic Law forbids the eating of animals that were strangled, the use of swine's flesh, the exercise of daily labour on the Sabbath, &c. The Christian system more particularly enjoins the discipline of the passions, and an abstinence from those pleasures which have a tendency to degrade our nature. In England, particular days have been appointed, called vigils and fasts, in which flesh is prohibited, and fish enjoined: this, however, being more a political restriction than a religious obligation, was first enacted in the reign of Queen Elizabeth, with a view to encourage our fisheries.

The effects of abstinence in the preservation of health, and the cure of diseases, are, by many physicians, stated to be remarkable. Dr. E. Miller, of New-York, in his Original Observations, relates that, in a district of the United States, which is particularly obnoxious to epidemic diseases, the febrile attack is often obviated and diminished by a *rigid abstinence* from food; and the celebrated Sydenham declares, that he has often cured the synocha, or inflammatory fever, and other fevers, by prescribing diluent drinks, and prohibiting every kind of aliment, even, to use their own words, "*for two or three days.*" The method, in this respect, adopted by Dr. Miller, was to commence his plan of abstinence on the first sensations of indisposition, and continue it on some occasions for a period of twenty-four, and even forty-eight, hours, until these feelings had subsided, the appetite was restored, and the calls of hunger become not only frequent, but even importunate. He concludes his interesting remarks with an aphorism, "That in those particular states of the body, which denote the *approach, and at the commencement, of acute diseases*, the strict observance of a rigid and continued abstinence has been productive of the most beneficial effects."—The late celebrated author of the "*Elementa Medecinæ,*" Dr. Brown, has, in that work, particularly enjoined it, as one of the means to be employed in the prevention and cure of sthenic, or inflammatory diseases; and he declares that the *cynanche tonsillaris*, or inflammatory sore throat, and the catarrh, or common cold attended with hoarseness, may often be cured by abstinence alone.

Men of genius, and persons who lead sedentary lives, are more especially benefited by occasional abstinence; as these, from the want of vigorous exercise, and their intense application, are generally the severest sufferers from diseases of repletion. In the observance of the rules of abstinence, due attention must always be paid to the age, strength, constitution, and habit of the patient.

With regard to the total abstinence of the sexes from sensual gratifications, it should be observed in this place, that it may, though rarely, be attended with serious effects; yet these seldom, if ever, take place in those who live regularly, and do not encourage libidinous ideas; and that both males and females would undoubtedly derive greater benefit from total continence, till marriage, than by an indulgence in venery; in the former case, they would not only in a great measure contribute to their vigour of body and mind, but also to the prolongation of life.

Of the brute animals, many are remarkable for their long abstinence from food, such as the serpent, the rattle-snake, tortoise, bear, dormouse, elephant, &c.

Instances may also be found, of men who have been abstemious to a degree almost incredible; and experience has demonstrated that, from habit and use, the power of abstinence may be either increased or diminished. Some persons will bear the attacks of hunger without any visible marks of impatience, while in others, a mere temporary privation will occasion the most urgent and distressing symptoms. See the article Fasts.

ACACIA, in botany, Egyptian thorn; according to Linnæus, is a species of *mimosa*, growing in Egypt. It is also to be found in North America, and is there called the *locust-tree*. Its culture is not difficult. It delights more in a dry, sandy, and elevated soil, but may be raised in any, either from seeds or slips. Its uses are various; as it is applied both to domestic and medicinal purposes.

An inspissated juice of its fruit, of a dark colour and firm consistence, has been brought to us from Egypt: when dissolved, it is used in any convenient liquor for relieving spittings of blood, complaints of the eyes, and quinsies.

The leaves of acacia are said to afford an agreeable nourishment to horses and horned cattle. They may be given, either green or dry, alone or mixed, with hay or chopped straw.

The flowers of the acacia are used by the Chinese in making that beautiful yellow with which they stain their silks and stuffs, and colour their paper, in the following manner: take half a pound of these flowers before they are fully blown, and roast them over a clear and gentle fire in a very clean copper pan, continually stirring them with a brisk motion; when they begin to turn yellow, pour on a little water, and let it boil till it become thick, and acquire a deeper colour; then strain the whole through a piece of coarse silk. To the liquor thus expressed, add half an ounce of alum, and one ounce of calcined and finely-powdered oyster-shells: when the whole is well mixed, it will be fit for use.

The origin of the bezoar has been attributed to the seeds of this plant, which being browsed by certain animals, have, by their great acidity and astringent qualities, caused a condensation of the juices of the stomach, and produced this celebrated concrete.

The acacia, or locust-tree of North America, has been applied to various parts of ship-building; and several gentlemen in the state of New-York have, after repeated trials, found, that posts for rail-fencing, &c. made of this tree, have resisted the influence of the weather better than any other timber, the swamp cedar even not excepted.

In England, the acacia tree is an exotic, and, on account of its being imported from a warmer climate, is supposed to be of a tender and delicate nature, and has therefore been propagated in a luxurious soil. Thus, as it grows remarkably fast, it not only becomes less firm and tenacious, but is very apt to split, and lose large branches: it may not, therefore, be so well adapted to the various purposes of building as those American trees, which are of a slower growth, and cultivated in a poorer soil, where they have sufficient time to arrive at maturity.

Acer compestre, L. See Common Maple.

Acer pseudo-platanus, L. See Sycamore Tree.

Achillea millefolium, L. See Milfoil, or Common Yarrow.

ACIDS are obtained from vegetable and mineral substances, either by fermentation or distillation.

The vegetable acids, however, such as the juice of limes and lemons, are frequently procured without the aid of art. They are of a saponaceous consistence, and therefore, in a variety of affections, eminently adapted to the human constitution. With respect to their general effects, it may be said that they attenuate the fluids, remove obstructions, stimulate the appetite, promote digestion, quench thirst, and, in hot seasons, counteract the putrid tendency of the animal humours: they afford an excellent remedy in pectoral, bilious, and inflammatory diseases, but particularly in the true scurvy, as likewise in all maladies of the kidneys; and are the most effectual antidotes against the narcotic vegetable poisons. Thus, a most powerful dose of opium may be checked in its soporific effects, if a proper quantity of the acid of lemons be taken with, or immediately after it. For instance, four grains of opium, or one hundred drops of laudanum, form a large, and sometimes fatal, dose;

but if one ounce of pure lemon-juice, or twice that quantity of good vinegar, be added to every grain of opium, or to twenty-five drops of laudanum, we can declare from experience, that such a compound will produce a very different effect. Instead of stupifying the head, and producing troublesome costiveness, it will not only relieve the bowels, but also occasion a degree of chearfulness never attainable by the use of opium alone, or strong liquors, and afterwards induce a composed and refreshing sleep. Hence the use of acids, to persons who are habitually obliged to take considerable doses of opiates, cannot be too strongly recommended. In the form of clysters, the mild vegetable acids, such as vinegar diluted with an equal quantity of cold water, are a safe and effectual remedy for costive habits: and few persons will be inclined to doubt their good effects, when sprinkled about the floors and walls of rooms inhabited by patients labouring under putrid disorders, especially in the heat of summer. As a proper substitute for the acid of lemons, we refer to the article BARBERRIES.

The mineral acids, however, are productive of very different effects: when applied in a diluted state to the human body, whether externally or internally, they generally contract, and gently stimulate, the animal fibre; but, in a concentrated form, violently stimulate, corrode, and destroy its texture. With respect to their comparative activity, the nitric acid, or *aqua fortis*, is the most volatile; the vitriolic acid, the most diffusible; and the marine acid, or spirit of salt, perhaps the most active and permanent in its effects on the human system. Hence the last has lately been used by Dr. REICH, of Erlang, in Germany, with unexampled success, in the cure of the *true typhus*, or putrid nervous fever, *after all other remedies had proved ineffectual.* This bold practitioner did not hesitate to give the muriatic acid, diluted with the smallest possible quantity of water, to an extent almost exceeding belief; though his cures appear to be sufficiently attested by the Royal College of Physicians at Berlin. The particulars of these extraordinary facts, we propose to lay before the public under the head of FEVER.

ACORNS, or the seeds of the oak, though not at present an article of human subsistence, yet, if we may credit the testimony of ancient writers, formed no small part of the diet of the ancient Germans and Britons; and the desire to possess what was then considered as a *table delicacy*, was often a cause of hostilities between various nations. They have seldom been used for medicinal purposes. We have, however, the testimony of several foreign practitioners in their favour, and especially that of Dr. MARX. In describing the valuable properties of acorn coffee, he asetts that this preparation has often cured obstructions arising from an accumulation of mucus in the viscera, and removed nervous complaints, when all other remedies have been tried in vain. The following is his method of preparing the *acorn coffee:*

Take sound and ripe acorns, peel off their shells or husks, divide the kernels, and, after gradually drying, roast them in a close vessel, keeping them in continual motion. In this process, however, particular attention should be paid, that they may not be burnt, or roasted to excess.

Take of the powder, when ground like other coffee, half an ounce, or about four small tea-spoonfuls every morning and evening; using it either alone or mixed with one teaspoonful of real coffee, and sweetened with sugar.

This kind of coffee has, by the frugal house-wife, been employed as an article of domestic economy, but has not obtained general sanction; nor do we pledge ourselves for its medicinal efficacy; though several foreign practitioners affirm that it is an excellent remedy in asthmatic, and other pectoral complaints.

Acorns possess an astringent quality, which may be extracted by steeping them in cold water, or boiling them. On expression, they also afford an oil, which may be advantageously used in the burning of lamps.

In the year 1756, an ingenious gentleman, Mr. Ellis, invented a method of preserving acorns for a considerable time, and of retaining in them the power of vegetation, by encasing them in wax. In this manner, they may be transported to distant climates, and preserved in a fresh state for several years; so that they can be transplanted with hopes of success.

Lastly, acorns afford a very proper and nutritious food for hogs, which are readily fattened by their use: and we are farther convinced, from their analogy to the horse-chesnut, that, by depriving them of their husks, soaking them carefully in *several* infusions of fresh water, then drying and reducing them to flour, they would, *in times of scarcity*, serve as a tolerable substitute for bread-corn; for by this simple, though troublesome, process, most of the astringent vegetables lose their acrid and bitter taste.

Acorus Calamus, L. See Sweet Flag.

ACRE, a denomination used in the measurement of land: an acre consists of four square roods, each containing 40 perches, or poles. In different countries it varies, according to the length of the pole, which is from 16½ to 28 feet. It is, also, divided into ten square chains, of twenty-two yards each, or 4840 square yards. According to Dr. Grew, the number of acres in England amounts to 46,080,000.

Actæa Spicata, L. See Herb Christopher.

Acton Water. See Mineral Waters.

ACUTE DISEASES are such as are either attended with inflammation, or other urgent symptoms, which bring on an early crisis, and render them dangerous in their consequence: hence they are opposed to chronic diseases, or those which, though of slower progress, may nevertheless terminate in dissolution. As the former are more in need of the immediate assistance of art, we shall state the most proper methods of treating them in their commencement, as well as the suitable diet and regimen to be observed in them, under the different heads of Apoplexy, Asthma (suffocative), Cholera Morbus, Colics, Convulsions, Cramps or Spasms, Epilepsy, Fevers (inflammatory), Fractures, Hydrophobia, Inflammations, &c. &c.

ADDER, in zoology, a name for the viper. As this reptile is well known in most parts of England, a particular description of it is unnecessary; but as accidents frequently happen by its bite, we shall present our readers with a list of the most esteemed remedies to be resorted to on such occasions, together with some account of this animal, and the means of destroying it, under the article VIPER.

Adder-stung is used in respect to cattle, when stung by any kind of venomous reptiles, as adders, scorpions, &c. or when bit by a hedgehog or shrew. For the cure of such bites, some persons use an ointment made of dragon's blood, with a little barley-meal and the whites of eggs.

Adderwort. See GREAT BISTORT, or *Polygonum Bistorta*, L.

Adonis Autumnalis, L. See PHEASANT'S EYE.

Adoxa Muschatellina, L. See TUBEROUS MOSCHATEL.

ADULTERATION is the corruption, or debasement by an improper mixture, of any substance that was originally in a pure state. This art, though not unknown to the ancients, has in modern times been carried to a great extent; insomuch that we are sorry to observe, the rules and principles upon which so pernicious a practice is founded, are considered as qualifications essential to those persons who supply others as well with the common necessaries, as the luxuries, of life. We are, indeed, provided with excellent laws against adulterations; but crafty and avaricious dealers take frequent opportunities, either of eluding the vigilance and severity of justice, or of concealing their nefarious practices in so skilful a manner, as to render their detection extremely difficult, and sometimes impossible. We shall, therefore, consider it as our duty to point out those articles which are most liable to this species of fraud. They may be found under the different heads of BEER, BREAD, COFFEE, HAIR-POWDER, HONEY, OIL, SNUFF, SPIRITS, TEA, TOBACCO, VINEGAR, WAX, WINE, &c. &c.

ADVERTISEMENT, generally, signifies any information given to those who are interested in a common concern. It more particularly alludes to a short account of an affair inserted in a public newspaper. We should scarcely have noticed this article, had it not been with a view to caution the unwary, and animadvert upon the fraudulent practices to which the advertisements of the present day are frequently subservient; for instance, those of money-lenders, servants'-office keepers, agents for place-men, adventurers, marriage-brokers, and other unprincipled individuals, who prey upon the credulity of the public. Hence we venture to suggest an opinion, that it would be more conducive to the interests of society, if the public prints were subjected to some regulations in this respect; and that no advertisement could be inserted, without being authenticated before a magistrate. By this precaution, the editor and printer of a newspaper, who sometimes become the innocent accomplices of fraud or swindling, would be secured against the attempts of those who frequently avail themselves of this mode of publication, to make it a vehicle for falsehood and depredation.

Aegopodium Podagraria, L. See GOUT-WEED, or HERB GERARD.

Aesculus Hippocastanum, L. See HORSE-CHESNUT, and FLOUR.

ÆTHER, a term formerly used to signify a thin subtle matter, finer than air, and completely filling the whole space of the firmament.

Various opinions have been held respecting its precise nature: by some it is supposed to be a fluid of a peculiar kind, and confined to the regions above our atmosphere; by others, a substance so subtle and penetrating, as to be intimately diffused through the air, and to insinuate itself into the pores of all other bodies. Its existence, however, has been denied by many, who assert that the air, by its tenuity and expansion, is fully sufficient for the above-mentioned purposes.

Whatever conjectures may be formed concerning the nature and properties of this subtle fluid, there is every reason to believe in the existence of a matter finer than the air itself. Sir Isaac Newton has observed, that heat is readily communicated through a vacuum, which cannot take place without the intervention of some other medium. This, being subtle enough to penetrate even through the pores of glass, may readily be conceived to be capable of pervading all other bodies, and diffusing itself through every part of space: and thus it conveys a complete idea of an æthereal fluid.

Æther is now principally considered as a chemical composition. It is a combination of vitriolic acid and spirits of wine, and is used for a variety of medical purposes. The head-ach is said to have been often cured by rubbing it on the temples; and Dr. Conyers declares, that a tea-spoonful applied to the affected jaw, and repeated till the pain ceases, is a never-failing remedy for the tooth-ach. It has also been used in cases of rheumatism, gout, and hooping-cough, with great success. In a paroxysm of suffocative asthma, and all those diseases where the organs of respiration are affected, half a tea-spoonful of vitriolic æther in a table-spoonful of water, quickly swallowed and occasionally repeated, has often produced instant relief. Even the simple evaporation of this volatile fluid, a spoonful of which may be placed at a time in a shallow vessel contiguous to the patient, has frequently been found of great service, and alleviated the most distressing shortness of breath.

A combination of spirit of sea-salt with the flowers of zinc, produces the marine æther.

Æthusa Cynapium, L. See Fool's Parsley.

AFFLICTION, as opposed to a state of joy and prosperity, cannot be called a disease, though when indulged to excess, it may be productive of many mental and bodily affections. For whatever tends to excite anger, hatred, envy, &c. cannot fail to bring on disorders arising from tense or rigid fibres; as, on the contrary, fear, grief, and excessive joy, engender those maladies which are the consequence of relaxation.

Hence we cannot be too much on our guard against the invasion of passions, which may be truly styled the greatest enemies of mankind. Lord Bolingbroke, in his Letters "on the study and use of history," gives the following pertinent advice: "Let us set all our past and our present afflictions at once before our eyes. Let us resolve to overcome them, instead of shrinking from the contest, or of wearing out the sense of them, by long and ignominious patience. Instead of palliating remedies, let us use the incision-knife and the caustic; probe the wound to the bottom, and work an immediate and radical cure." Uninterrupted misery, continues this stoic philosopher, has this good effect, that, as it continually torments, it finally hardens the sufferer.

After-Birth. See Midwifery.

AGARIC of the oak, or the *Agaricus Quercinus*, L. is well known as a styptic, when applied to external wounds. M. Adouillet, an eminent French surgeon, has employed it, instead of ligatures, on the arteries, in cases of amputation, by applying small pieces of it to the mouths of these vessels, and afterwards covering the stump with lint.

This species of agaric may be usefully employed for the purpose of dying silks of a black colour: to succeed in the experiment, it ought to be cut in small pieces, and boiled in a solution of copperas, over a gentle fire, till the dye be sufficiently strong.

Another species of agaric, namely, the common *puff-ball*, has, by farriers also, been used as a styptic: and, in an experiment made upon a horse, it completely stopped, in a few minutes, a hemorrhage from one of the largest arteries. The wound afterwards healed, without any farther discharge.

We cannot, on this occasion, omit to remark, that persons living in retired situations, and particularly those employed in husbandry, as well as artizans working with sharp instruments, ought always to be provided with some styptic, which, at a distance from medical aid, and in a moment of emergency, may sometimes save an useful animal, and even the life of a fellow-creature, by its timely application.

The efficacy of agaric, as a styptic for external wounds, has, however, been disputed by Mr. NEALE, a surgeon of the London Hospital, who published some observations on the subject, in the year 1757. He asserts, that he has seen it used on several occasions, and frequently employed it himself, without effect, nay, to the detriment of the patient.

Agaricus Muscarius, L. See MUSKY MUSHROOM.

AGE signifies any period of duration. It is indiscriminately used to express many objects and situations, but is more frequently applied to the latter or advanced periods of human life; and, in this sense, is accompanied with the epithet *old*.

Human existence has been divided into four distinct periods, viz. infancy, youth, manhood, and old age. The gradation through these successive stages is often slight and imperceptible; it may be either accelerated or retarded, according to the more or less prudent conduct of the individual, the mode of life which is pursued, and the various rules and precautions observed in diet, regimen, &c.

Age, when accompanied with other good qualities, is more especially entitled to respect and reverence; but, if marked with ignorance and folly, becomes disgusting and contemptible. See the article LONGEVITY.

Agglutination. See CEMENT.

Agility. See ATHLETIC ART, or GYMNASTIC EXERCISES.

AGITATION is the art of shaking a body, or tossing it backwards and forwards. In physics, this term is often used for a commotion of the parts of a natural body. Fermentation and effervescence are attended with a brisk agitation of the particles.

Agitation is also one of the chief causes or instruments of mixtion. By the agitation of the parts of the blood and chyle, sanguification is in a great measure effected. Butter is also made out of milk by the same means; a separation of the oleous from the serous parts taking place, and a combination of the former among themselves. Digestion is supposed to be accomplished by an insensible kind of agitation.

This term is also used in medicine, to denote that species of exercise,

cise, commonly called *swinging*; which has been found serviceable in several complaints; and it is asserted, that even the *tooth-ach* and *deafness* have sometimes been removed by violent agitations of the body. We propose to make some farther observations on this species of exercise, under the article SWINGING.

AGONY is a term used to signify an extreme degree of pain, or the last pangs of death. The terror of death appears, in a great degree, occasioned by the contortions and convulsions with which the agony seems attended; though the general opinion of physiologists is, that in such cases the sensations of pain are not very acute; a course of affliction during sickness, having naturally indisposed the nerves for any quick sensations.

Various means have been employed for mitigating the agonies of death, such as opium, &c.; but these attempts are, by judicious persons, generally discountenanced: the conscious reflection of having spent an active and useful life, is, on this occasion, the most effectual remedy which suggests itself to the christian and the philosopher.

AGRICULTURE is the art of cultivating the earth, so that it may produce the vegetables we desire in their greatest perfection. It may be divided into two branches; namely, theory and practice. The former particularly treats of the various means of preparing and managing the soil and manure, and of the different kinds of vegetables which are adapted to particular soils, and most proper to be raised for the consumption of men, cattle, &c. The latter relates to the implements of husbandry, the various methods of cultivating land, raising crops, and feeding cattle.

Agriculture is one of those arts which, from the earliest periods, have been deservedly held in the highest estimation. One of the first injunctions upon our original progenitor, after his dismission from the garden of Eden, was, that he should "till the ground." Subsequent experience has fully proved, that the cultivation of this necessary art essentially contributes to the prosperity of mankind, and that it ought to form a primary object in all moral and political regulations.

In the earliest ages, and among those nations which have been celebrated for their refinement and civilization, agriculture has been highly prized, and carried even to considerable perfection. Among the Hebrews, high birth or rank conferred no exclusive distinctions; for it was then considered as the most honourable of human employments. By this valuable art, the Chaldeans discovered the means of procuring successive crops of corn, which enabled them to remain stationary, and not migrate, as their predecessors had formerly done, in order to obtain subsistence for themselves and their flocks. So sensible were many nations of its great importance, that, according to the history of the ancient Persians, their kings, once in every month, divested themselves of regal pomp, and ate with husbandmen. In China, a day is still annually appointed, when the emperor goes in solemn procession to a field, where he shews his sense of the inestimable benefits of agriculture, by undertaking, for a short time, the laborious occupation of directing the plough in person. Among the Romans, the rural art was deemed so honourable a pursuit, that the most distinguished senators, at their leisure intervals, applied themselves to the cultivation of the soil. NUMA POMPILIUS, one of their first kings, was distinguished as much for his skill in agriculture, as for his exemplary piety; and such was the amiable simplicity of those times, that their greatest warriors and legislators, were often called from the active labours of the field to the higher, but not more dignified, offices of the state. CATO, the censor, who had governed and subdued many warlike nations, did not consider it beneath him to write a treatise on agriculture; and several valuable works upon this subject, appeared at various periods of the Roman empire.

The Athenians first taught the use of corn to the rest of Greece; and after tasting bread, returned public thanks to the gods for such an unexpected and valuable blessing. By continued applications, they brought rural economy to a high degree of perfection, and soon reduced it to an art. The most eminent Greek writers upon agriculture were HESIOD, ZENOPHON, DEMOCRITUS of Abdera, SOCRATICUS, ARCHYTAS, TARENTINUS, ARISTOTLE, and THEOPHRASTUS.

Previous to the establishment of the Romans in this country, the art of agriculture was but little known in Britain. By their assistance, however, it experienced considerable improvements, insomuch that they were enabled annually to export large quantities of grain from this island. Subsequent to this period, it has been continually advancing in its progress; and, by the great encouragement it has of late experienced from the more enlightened classes of society, more especially from our present gracious Sovereign, who has in an eminent degree devoted himself to its study and improvement, it bids fair to attain a high degree of perfection. Societies have lately been formed for the purpose of encouraging this, and other useful arts; and a plan has been proposed for introducing the study of agriculture into our schools, and making it a necessary part of national education.

In the year 1756, a period of difficulty and distress, France began to pay particular attention to this important subject. Prize questions were annually proposed by the academies of Lyons, Bourdeaux, and by the society instituted for the improvement of agriculture in Brittany. About this time, also, it was greatly encouraged in Russia, Prussia, Sweden, Denmark, Germany, and Italy; in the last mentioned country, a private gentleman, about 40 years ago, left his whole fortune, to the establishment and support of an agricultural academy. The Dutch seem to be the only nation in Europe, by which rural economy is treated with apparent neglect; for, with the single exception of draining their fens and morasses, they have scarcely deemed it an object worthy of public support.

Whether we consider agriculture as a means of procuring as well the necessaries as luxuries of life; of providing a security against the aggregated calamities of scarcity, famine, and disease; or of engaging the mind in active and extensive pursuits of general knowledge, it is one of the most useful and important of all the arts which have employed the attention of mankind. Its theory is, in a great measure, dependent on several branches of science, such as natural history, chemistry, experimental philosophy, and mechanics, all of which may be successively applied to its advancement; and without a competent knowledge of these, it cannot be properly understood. Its practical part, however, may be carried on, independently of scientific experiments. No person, therefore, need be deterred from attempting any improvements, because he is not conversant with the more abstract parts of physical knowledge.—This art is also eminently useful, because it furnishes us, to a considerable degree, with the means of commerce; for the quantity of corn which we do not want for our own use and consumption, may always find a ready market, if exported to other countries.

The flourishing state of our manufactures is greatly dependent on that of our agriculture; because the price of those commodities obtained by labour, is not only closely connected with that of the necessaries of life, but some of the most considerable articles of manufactures are originally supplied by agricultural productions, such as wool, flax, hemp, rape-seed, tallow, &c.

The successful advancement of the rural art depends upon two circumstances; the one, its improvement by discovery or invention; the other, a more extensive practice of such improvements, when fully demonstrated. The former is effected, by the contrivance of more perfect machines and implements of husbandry, which facilitate the progress of labour; the introduction of new articles of profitable culture, and the most advantageous method of treating those which have already been cultivated, though in a defective manner. The latter, namely, the practice, relates not only to future improvements, but likewise to those which, though generally known, have been either wholly neglected, or adopted only in particular places.

Various plans have lately been devised for the purpose of encouraging agriculture; such as the inclosure of waste lands, the draining of fens and morasses, the construction of inland canals, &c. On the subject of *inclosures*, Dr. DARWIN says, "There can certainly be no objection to the inclosure of commons, or at least to their division into private property, as they are believed to produce more than *tenfold* the quantity of sustenance to mankind, if they are employed in agriculture, or even in pasturage, than by nourishing a few geese, sheep, or deer, in their uncultivated state, covered with fern, heath, or gorse."

To conclude: agricultural pursuits will always constitute one of the principal employments of the bulk of mankind; it is, therefore, as well the interest, as the duty, of the higher classes, to contribute every comfort in their power, towards alleviating the burthens inseparable from the lot of the husbandman. For, so long as that valuable body of the people, who cultivate the soil, were duly stimulated to habits of industry, and encouraged in the practice of domestic virtues, we find no example in the pages of ancient or modern history, that such a nation ever suffered a general calamity. We do not, however, here allude to any particular period of scarcity, which may be either real or artificial, and the causes of which we shall not pretend to investigate. But, on the whole, there can be no doubt that the system of husbandry now followed in this country, together with the praise-worthy exertions of the Board of Agriculture, and the different societies instituted for this purpose, will be ultimately productive of the happiest effects.

On this occasion, we should consider ourselves deficient in gratitude and duty, if we omitted to mention the names of those illustrious patriots, who have so materially contributed to the scientific progress, and successful practice of agriculture in this island. Such are, the present Duke of Bedford, Lord Somerville, Sir John Sinclair, Dr. James Anderson, Mr. Arthur Young, and especially our worthy friend and professor, Dr. Coventry, who fills his academical chair, in the university of Edinburgh, with general satisfaction. As this gentleman is the only *public* teacher of agriculture in the British empire, we shall in justice to his merits observe, that he is not merely a theoretical lecturer, but that he takes every opportunity of enforcing his excellent precepts by practical example; for he cultivates one of the best regulated and most productive farms in Fifeshire.

For an account of the different subjects connected with agriculture, we refer the reader to the articles, as they are classed in the order of the alphabet.

AGRIMONY, Common; or *Agrimonia Eupatoria*, L. is an indigenous plant, which grows in elevated situations, and is frequently met with about hedges and roads. It is represented in the 6th and 7th plates of Curtis's *Flora Londinensis*, p. 317.

In a medicinal view, the leaves of this vegetable are said to be aperient, detergent, and to strengthen the tone of the viscera; hence they have been used in laxity of the intestines, in scorbutic, and other disorders arising from debility. Digested in whey, agrimony affords a diet-drink grateful to the palate and stomach; though its leaves have an herbaceous and roughish taste, accompanied with an aromatic flavour. The leaves and stalks, together with the closed flowers, afford a dark yellow decoction, which, when previously impregnated with a diluted solution of bismuth, imparts a beautiful and permanent gold-colour to animal wool. We are induced to state this fact upon the authority of M. Dambourney, who, in the year 1793, published a volume of "Facts and Experiments on genuine and permanent Colours," printed at Leipzig, in the German language.

The blossoms of the common agrimony have also been occasionally employed by tanners, for curing soft and delicate skins.

AGRIMONY, Hemp; or *Eupatorium cannabinum*, L. is likewise a native plant, and grows chiefly on the banks of rivulets, and near hedges. A representation of it may be seen in Sowerby's *English Botany*, p. 428, plates 7 and 8.

In its sensible and medicinal properties, this plant much resembles the preceding species; and its leaves are also stated to be very efficacious in dropsy, jaundice, and similar disorders.

According to an account given by the celebrated Boerhaave, hemp-agrimony is the common medicine of the turf-diggers in Holland, for scurvies, foul ulcers, and those swellings in the feet, to which they are much exposed. Although the root of this plant be not, at present, in common use, yet it is asserted to be a powerful laxative.

In dying, the leaves of this vegetable, especially with the addition of logwood, and boiled with a proper solution of green vitriol, strike a good black colour. Dambourney informs us, that he has obtained a *mordore,* or yellow dye, by making a decoction of the whole plant.

Agrostemma Githago, L. See Corncockle.

Agrostis Spicaventi, L. See Silky Bent Grass.

AGUE is a general term for those fevers which have periodical intermissions, and are *specifically* denominated *quotidian, tertian, quartan,* according to the various periods at which the febrile paroxysm returns.

Agues are, in some degree, endemial, or peculiar to certain situations. In the county of Kent, and the fens of Lincolnshire, they have become proverbial. They more frequently attack men than women, the young than the old, the poor than the rich: sufficient reasons may easily be assigned for this peculiarity. The habits and employments of the male sex, especially at the time of youth, subject them to causes which more particularly predispose them to that disease, such as cold moist air, wet feet, long exposure to rain, and wet clothes; whereas females, and the aged of both sexes, keep more within doors.

From this statement it may readily be inferred, that persons who reside in certain districts of a country, are more frequently affected with these fevers, than those enjoying a purer atmosphere, and inhabiting a drier soil.

That the poor are more liable to agues than the rich, may in some measure be ascribed to the abovementioned causes. The difference of their *diet,* and clothing, may also be supposed to possess an influence in admitting or resisting this disease.

The symptoms generally observed during the cold fit in agues, are, strong shiverings, succeeded by great heat, and the usual concomitants of fever, such as thirst, quick pulse, &c. The hot fit is terminated by a perspiration more or less profuse, according to the habit and constitution of the patient.

Several other symptoms occasionally present themselves in the different stages of the disease. The cold fit is often preceded by torpor, languor, lassitude, yawning, stretching attended with nausea, vomiting, and sometimes, in weak habits, with diarrhœa. The hot fit is ushered in with languor; a flaccid state of the whole body, but especially of the limbs; a general sense of soreness, as if the parts were bruised; a quick pulsation of the arteries, sometimes attended with throbbings and pain in the head. The duration of the paroxysm, before it terminates in the sweating fit, is irregular in respect to time, seldom subsides in less than six hours, and never exceeds twelve. The urine which the patient evacuates in the last stage, commonly deposits a reddish sediment. During the interval of each paroxysm, the patient apparently enjoys as good a state of health, as previous to the attack of this disease. Nevertheless, if it be suffered to continue long, it weakens and exhausts the constitution, and occasions such ravages as medicine cannot easily repair; producing general debility, obstructions in the viscera, jaundice, dropsy, &c.

We shall proceed to point out a few of those remedies which have been found effectual in this disease.

A tea-spoonful of powdered snake-root mixed with a glass of brandy and water, and taken before the approach of the fit, keeping the body warm to induce perspiration, has been of considerable service. The following remedy is also said to have been successfully employed in agues:

Two spoonfuls of the juice of sage, mixed with an equal quantity of vinegar, and taken at the approach of the fit.

The regular method of eradicating an ague, after the disease has been properly ushered in, by a few successive paroxysms, consists in cleansing the first passages by proper laxatives and emetics, as occasion may require.

The patient, during the fit, should drink freely of water-gruel, and other warm diluents. The Peruvian bark may then be administered in any form best suited to the patient's stomach, either in decoction, infusion, tincture, or in powder mixed with Port wine. The last mode, as being the most efficacious, ought, when practicable, always to be preferred.

Dr. LYSONS has observed, that his patients derived great benefit from the use of the snake-root combined with bark. His recipe is as follows: two scruples of bark and one of snake-root. He says, that two or three doses rarely fail to arrest the progress of a *distinct* tertian, or quartan ague. Should a farther repetition of this remedy be requisite, it will be attended with this advantage, that the disorder will be less likely to return, than if it were stopped by the bark alone.

Repeated shocks of the electrical fluid have been said to cure agues; but this is a precarious and hazardous practice. Even that sovereign remedy, the bark, has sometimes been known to fail, and yet the patient has been cured by common *spiders*, three or four large ones mixed up with honey, their legs cut off, and the bodies only retained.

The folly of placing any dependence upon *charms*, and such occult modes of curing this disease, needs no other reprobation than to say, that they have been adopted by the ignorant multitude, and that they have more frequently failed, than succeeded, in vanquishing an obstinate intermittent.

Lastly, if no other means be found adequate to the inveteracy of this complaint, we cannot, in justice to Dr. FOWLER, omit to mention his *mineral solution*, or ague-drops, so well known to all our apothecaries, that they require no farther description. Yet, convinced of their violent effects on the human system, we seriously recommend the use of the remedies above specified, before *arsenic* be employed as the ultimate resource.

AIR, in a pure state, is a colourless, transparent, compressible and elastic fluid; and one of the most important elements, whether we consider its application to purposes of general economy, or its effects on animated nature. It is the medium through which we breathe, and without which we cannot exist. When perfectly freed from all extraneous and noxious particles, it may be denominated *vital air*, or *oxygen*; and in this state is capable of invigorating and supporting the human frame, in a very eminent degree. Mixed with the common ingredients, it is called atmospheric air, or that by which we are usually surrounded.

In diseases of the lungs, and epidemics arising from a confined or vitiated atmosphere, the administration of air, in a pure state, has been attended with singular success;

while, in such complaints, the most powerful remedies have been unable to compensate the want of this necessary article.

Air vitiated by the different processes of respiration, combustion, and putrefaction, or which is suffered to stagnate, becomes prejudicial to the human frame: hence large cities, public assemblies, hospitals, burying-grounds, &c, are injurious to health, and often productive of contagious disorders.

Plants and vegetables possess the wonderful property of restoring the purity of air. This, however, takes place only in the day-time, and when they are exposed to the light of the sun: for at night they discharge their noxious particles, and corrupt the atmosphere. Nevertheless, the disadvantage arising from their impure exhalation during the night, is far exceeded by the benefits produced in the day-time; as the former does not amount to a hundredth part of the pure vital air, which is generated by the same plant, in the course of two hours of a fine day. It has been asserted, that the purity of air may be also restored by wetting a cloth in water mixed with quick-lime, hanging it in a room until it become dry, and renewing the operation so long as it appear needful.

Air has been most successfully applied to various purposes of domestic economy, and in many branches of the useful arts; such as in the construction of wind-mills, air-guns, stoves, &c.

A mode of forwarding the distillation of salt water at sea, has been discovered, and consists simply in blowing currents of air through the distilled fluid. The same method has also been successfully employed to take off the unpleasant taste which is sometimes found in milk.

Dr. Reich, of Erlang, describes a particular machine for the purpose of extracting air from the intestines, and thus procuring instant relief in a complaint called *tympanites*, or the dry windy dropsy. A small tube with a cock having a valve on its side, and so constructed as to turn quickly, is affixed to the common clystering machine. Upon each successive introduction, the cock must be turned, in order to admit the air into the tube, and then quickly closed.

Air which is rarefied, ascends. This is particularly exemplified in the periodical sea and land breezes of hot climates; where, in consequence of the reflection of the sun from the earth's unequal surface, the lower land-air becomes highly rarefied, and rises into the upper atmosphere, while the sea-air, being cool and dense, rushes in to supply its place. Upon this principle, M. Van Marum, a Dutch chemist, has discovered a method of purifying assembly-rooms by a tin tube of nine inches diameter, and ten feet length, to the lower surface of which lamps are suspended, for the purpose of rarefying the air, and urging it to ascend through the ceiling of the room.

Dr. Hales has described the useful effects produced in French prisons, by long air-trunks fixed through the ceilings of wards in gaols, to carry off the foul vapours which exhale from the prisoners: he declares that it has not only preserved many of their lives, but prevented them from communicating infectious distempers to persons assembled in the courts of judicature.

We are happy to add, that this valuable improvement has also been adopted in this country.

An apparatus invented by Mr. SALMON, of Canterbury, for the expulsion of noxious air from wells, has been employed with considerable success.

Air-balloons are constructed upon similar principles; they continue to ascend, so long as the inflammable gas with which they are filled be lighter than the atmosphere with which they are surrounded.

Noxious and mephitic vapours, arising from wells and other subterraneous places, may be effectually corrected by simple ventilation, or the admission of such portions of vital air as will render the whole sufficiently respirable.

To ascertain whether the air of a mine, well, cellar, or large cask, be safe, a lighted candle, suspended by a cord, ought to be conveyed to the bottom, before any person venture to approach it. Should a slight explosion take place, or the light burn dimly, or even be extinguished, the air is certainly noxious; but if the flame continue bright, no danger is to be apprehended.

Another easy expedient of purifying foul air may be adopted, by pouring several vessels of boiling water into such receptacles, before any person be suffered to descend.

A still better method of dispelling the deleterious air from deep wells or pits, is the following: take a leather tube of sufficient length to reach to the bottom of the shaft or cellar; fix the nozle of a pair of large bellows to the top, and work them briskly for a few minutes: thus fresh air will be introduced, the flame of the candle, on trial, will not be extinguished, and we may descend without any danger.

Artisans who are employed over *charcoal-fire*, such as dyers, gilders, refiners of metal, &c. are exposed to considerable danger from the vitiated state of the air: to avert the injury to which their lungs are thus exposed, it would be advisable to place near them a flat-bottomed vessel filled with lime-water, and to renew it every other day, or so often as a variegated film or pellicle appear floating on such water. This powerfully attracts and absorbs the pernicious exhalations produced from the burning of charcoal.

Likewise, in the construction of chemical laboratories, smelting-mills, and similar offices, proper attention ought to be paid to their free and constant ventilation; as the metallic fumes, and other noxious vapours which they generate, are highly detrimental to health.

In chronic diseases, especially those of the lungs, a change of air is strongly recommended. It has sometimes, independently of any other circumstance, proved highly beneficial; inasmuch as patients have breathed more freely, even though removed to a damp and confined situation.

The following places in the vicinity of London, have been found in the spring season to be most congenial to consumptive persons, viz. Camberwell, Peckham, the lower parts of Clapham, the drier parts of Lambeth, Battersea, Fulham, Chelsea, &c. As the more temperate season advances, the higher situations, such as Paddington, Pentonville, Hampstead, Highgate, &c. may then be resorted to with advantage.

Aira Cespitosa, L. See TURFY HAIR GRASS.

AIR-BATH, in its general acceptation, implies a contrivance for the reception of *fresh* air. All persons, but especially children, ought to resort, at least for a short time, *every day* to this method of enjoying the salubrious influence of that universal agent.

To persons of a robust and vigorous habit, we cannot recommend a more bracing and pleasant remedy. In this place, however, we shall give only an historical sketch of the simple air-bath, without expatiating on its nature and effects. Its benefits were first pointed out by the late illustrious FRANKLIN, who describes it with his peculiar simplicity, in the following words: "Every morning at day-break I get out of bed, and pass half an hour, or an hour, in my chamber, according to the season, in writing or reading, without any clothes; and this seems rather pleasant than otherwise: and if I return to bed, as is sometimes the case, before I dress myself, I have an addition to my night's rest of one or two hours sleep, sweeter than you can imagine."

The late Lord MONBODDO, a man of an amiable, though eccentric character, was so decided an advocate for the air-bath, that he accustomed himself to take violent exercise, when quite undressed, in the open air. In this practice he persevered till within a few years of his death (which happened in May, 1799); he also anointed his body, like the ancients, with aromatic oils, especially in a moist and heavy atmosphere.—Whether by these singular expedients, or by a frugal and philosophic mode of life, he enjoyed that extraordinary degree of mental serenity and bodily energy, which prolonged his existence to the 90th year of age, we shall not pretend to decide.

AIR-JACKET, a dress made of leather, in which are contained several bags or bladders, composed of the same materials, and communicating with each other. These are filled with air blown through a leather tube, having a brass stop-cock, accurately ground at its extremity. In order to confine this elastic fluid, the jacket must previously be wetted; and thus the person is supported in the water without any effort, by the aid of these bladders placed near the breast. Those who are proficients in the art of swimming, condemn such artificial assistance as cannot always be readily procured: in our opinion, the most proper and easy method of acquiring this useful talent, is that mentioned by Dr. STRUVE, in his German treatise on the Physical Education of Children, lately published, with three Introductory Lectures by the Editor of this Encyclopædia.—See the article SWIMMING.

Aix-la-Chapelle. See MINERAL WATERS.

ALABASTER, is a species of stone, the basis of which is calcareous earth. Mixed with any acid, no effervescence takes place; in this respect it differs from marble, but in its chemical properties it resembles gypsum, selenite, and plaster of Paris. There are three species of alabaster; the white-shining; the yellowish; and the variegated, a mixture of yellow and red. The last indeed, violently ferments with aqua-fortis, and burns to a pale yellow. It was formerly brought from Egypt, but is now obtained in several parts of England.

Mr. BOYLE, speaking of the first sort, says, that, if finely powdered, and set in a bason over the fire, it will, when hot, assume the appearance of a fluid, rolling in waves, yielding to the smallest touch, and emitting vapour. On the departure of the heat, it loses these properties, and again becomes a mere incoherent powder. So great is the transparency of this stone, that it has sometimes been employed for windows, and at Florence a church still receives its light through the medium of alabaster. It is found in the greatest abundance near Coblentz, in Germany; near Cluni, in France; near Rome, in Italy; and in some places of Lorrain.

Alabaster, or marble, may be cleaned by the following process: beat pumice stones to an impalpable powder, and mix it up with verjuice: let it stand for two hours, then dip into it a sponge, and rub the marble or alabaster, wash it with a linen cloth and fresh water, and dry it with clean linen rags.

ALARUM, a term employed to signify any instrument, or contrivance, for the purpose of awakening persons from sleep, at a certain hour, or of alarming them when exposed to danger. In the former sense, it is generally a part of clock-work, and deserves here no farther notice; but, in the latter, we strongly recommend the utility of alarums to every family, whether living in towns, or in solitary situations in the country.

Many ingenious suggestions have been devised, for affording security to the industrious, against the audacious attempts of house-breakers: the most common of these are, hanging bells to the windows, or larger bells and rattles kept in readiness for giving early notice to the watchman absent from his duty, or to the peaceful neighbour whose aid is required.

In the year 1771, Mr. HENRY invented a curious alarum, which was highly approved by Sir JOHN FIELDING. All burglaries being perpetrated at night, this piece of mechanism deserves peculiar encouragement. On being fixed up by a bell-hanger, with wires fastened to the windows and doors, it will, upon the least attempt to break into the house, go off with a noise sufficient to awaken the family. As every clock-maker is acquainted with the construction of this alarum, we think it unnecessary to give a particular description.

ALBUMEN, properly signifies the white of an egg, but has lately been used in chemistry, to denote likewise one of those elementary constituents of vegetable bodies, which, in its colour and properties, bears an exact resemblance to the animal substance known under this denomination.

The white of eggs, if taken warm from the hen, especially in lukewarm milk, is uncommonly nourishing to the weak and infirm; but, when boiled hard, its nutritive quality is in a great measure destroyed, and it then becomes very difficult of digestion.

If the white of a fresh egg be applied to *burns*, immediately after the accident, it generally prevents them from rising in blisters: it also tends to abate recent inflammation of the eyes, when spread upon soft linen, and placed over the parts affected. Used as a lotion on the face, it preserves it from sun-burning or freckles, in the heat of summer. On the contrary, a very small portion of the white of an egg, if swallowed in a *putrid* state, is attended with dreadful effects; such as nausea, horror, fainting, vomiting, diarrhœa, and gripes, accompanied by heat, thirst, and fever, while it inflames, or violently stimulates the bile, and, not unlike the plague, promotes a speedy dissolution of the humours.

It is remarkable that, according to BOERHAAVE, the white of eggs was employed by the reputed PARACELSUS, as a menstruum of extraordinary properties; and which greatly contributed to his fame. When boiled hard in the shell, and then suspended in the air by a thread, it dissolves and drops down into a flavourless liquor; which, though destitute of acrid, oily, or saponaceous ingredients, makes a more perfect solution of myrrh than either water, oil, spirits, or even fire itself can effect.

In domestic economy, the white of eggs is usefully employed for clarifying ale, wine, &c. for which purpose it should be mixed with the liquor, and the whole boiled together: thus all the gross particles of the latter will subside, or be carried off with the former, which, by this process, is reduced to a concrete state, and is either precipitated, or combined with, the feculent ingredients of the liquid.

The *vegetable albumen* is one of those primary constituents of plants, which may be separated by chemical aid, without undergoing any change of their native or inherent qualities. It is found principally in cresses, scurvy-grass, hemlock, and most abundantly in the antiscorbutic and narcotic plants, where it generally resides in the leaves. Its existence may be easily discovered, by mixing the freshly expressed juice of these plants with spirits of wine, or by macerating them with hot water, nearly to the boiling point: in both cases, the albumen will be coagulated and separated from the other fluids in the form of cheesy matter. It is, perhaps, superfluous to observe, that this vegeto-animal production may in times of scarcity serve as a proper substitute for the white of eggs; it being possessed of similar properties.—See the article EGGS.

Alcali. See ALKALI.

Alcea rosea, L. See HOLLYHOCK and PAPER.

Alchemilla vulgaris, L. See COMMON LADIES' MANTLE.

ALCHEMY is the art of transmuting metals into gold, or changing the inferior into more precious ores. It was formerly much cultivated, and held in high estimation by fanatics, as well as by many learned but deluded men: in later times, however, it has been almost generally exploded, and is now pursued only by crafty impostors.

The ruin which frequently attended this popular delusion, became so extensive, that alchemy has, at various times, been proscribed in several states. The Romans banished such persons as professed it; and DIOCLESIAN and CÆSAR ordered all books on this subject to be publicly burned. In England it has, at no period, been much encouraged; for the native good sense of our countrymen generally prevailed, so that this useless art has, by the more enlightened, always been considered in its true colours.

ALCOHOL, in chemistry, signifies spirit of wine, in a more ardent and purified state, obtained by distillation. Its specific gravity is to that of distilled water, as 815 to 1000. When diluted, in the proportion of about twenty ounces to seventeen of water, it is called proof spirit, and is used for tinctures, distilled cordials, &c.—See the article, SPIRIT of WINE.

ALDER-TREE, or the *Betula* of LINNÆUS, is so well known by the name of common birch, as to require no particular description. There are three species, 1. the *alba*, or common; 2. the *nana*, or dwarf; and 3. the *lenta*, or Canada birch: the last of which grows to a height of upwards of ſixty feet. The *alnus*, or alder-tree, is, properly speaking, another species of the Canada-birch. When suffered to grow in an open situation, it has an agreeable appearance. Whenever any soil be intended for pasture, the alder should by no means be encouraged, as it poisons the herbage, and renders the soil moist and rotten.

The *alba*, or common birch, is easily propagated; either from seeds or layers, and will flourish in most soils. While in the nursery, they should, in dry weather, be constantly weeded and watered. According to HANBURY, the best method of producing them, and preserving their varieties, is by distributing them in layers.

The wood of this tree was, in ancient times, used for the construction of boats, and at present, on account of its hardness, is employed in the north of Europe for making carriages and wheels. In France it is generally used for wooden shoes; and in England for women's shoe-heels, travelling boxes, &c.; it also affords very good fuel. In Sweden it is employed for covering houses, and is very durable. On deeply wounding, or boring the trunk of this tree, in the beginning of spring, a sweetish juice exudes in large quantities; and one branch alone will yield a gallon in a day. This juice is recommended in scorbutic disorders, and other impurities of the blood. Its most sensible effect is in promoting the urinary discharge. By proper fermentation, and with the addition of sugar, it makes a pleasant wine. The plant itself is astringent, but the bark of the black berry-bearing alder, is affirmed to be the most certain purge for horned cattle. The leaves, when eaten by cows, are said greatly to increase their milk.

ALE, a fermented liquor, extracted from malt by the process of brewing. It differs from beer, in having a less proportion of hops. This beverage was first made in Egypt, and used as a substitute in those climates which were unfavourable to the production of the grape. Among the Anglo-Saxons and Danes, it was a favourite drink, and they believed, that large and frequent potations of it constituted one of the chief enjoyments of those who were admitted into the Hall of Odin.

There are various kinds of ale, particularly the pale and brown; the former, being brewed from malt slightly roasted, is esteemed more glutinous and wholesome than the latter, which is made from malt of a drier nature.—It may be prepared in various ways, from wheat, rye, millet, oats, barley, &c. Its consumption in this country was, about twenty years ago, computed at the value of four millions sterling annually, including Great Britain and Ireland.—See the articles, BEER, and BREWING.

In cold countries, and to persons who take considerable exercise, ale may be of service, but in weak and lax habits, it is often attended with disagreeable effects, such as indigestion, flatulency, &c. When drunk to excess, it has sometimes occasioned *cholera morbus*, and severe colics.

Various methods of *preserving* this valuable liquor from turning sour on long voyages, have been proposed; of which the following appears to be the most effectual: it was first published by Dr. STUBBS, in the 27th Number of the Philosophical Transactions. For its discovery we are indebted to an ale-seller at Deal; and it was tried with success in a voyage to Jamaica—"To every runlet of five gallons, after being placed in a cask on ship-board, not to be stirred any more, put in two new-laid eggs whole, and let them lie in it; in a fortnight, or little more, the whole egg shells will be dissolved, and the eggs become like wind-eggs, inclosed only in a thin skin; after this, the white is preyed on, but the yolks are not touched or corrupted, by which means the ale was so well preserved, that it was found better at Jamaica than at Deal."

ALE-HOUSE, a public place of resort for drinking ale or beer.—Houses of this description are licensed by justices of the peace, who take recognizance of the landlord, and sureties in ten pound each, that he will suffer no unlawful gaming, nor other disorderly practices in his house.—This license is renewed every year, upon producing a certificate of his character and conduct. Any person neglecting to procure a license, is liable to certain penalties, adequate to the frequency of the offence.

The utility of ale-houses has been much questioned; they certainly, in some degree, encourage habits of intemperance and dissipation; yet, we must acknowledge, that by the subsistence which they afford to a considerable part of the community, the facility with which they enable those who cannot brew for themselves, to procure their liquors at intervals, and in small quantities; and the social relaxation they procure for the weary traveller, as well as the industrious peasant, they materially contribute to the ease and enjoyment of a portion of society, over whom the moralist may be safely allowed to exert the sober influence of persuasion, but with whose amusements the legislature should cautiously interfere.

ALIMENT. By this term is understood the nutritive quality of such substances as are dissolved and mixed in the stomach, and converted into chyle, by the digestive process. It may be considered rather as the consequence of food taken by a healthy individual, than as an article of food itself; for all kinds of animal and vegetable bodies do not furnish an alimentary supply, or at least not in the same proportion.

Of those articles which afford it in the highest degree, animal food is the principal; being most easily digested, and furnishing a greater quantity of that milky fluid, called *chyle*. For this purpose, however, a due mixture of vegetables must be added, in order to correct its high luxuriance, and to render it more congenial to our nature.

Fresh air is one of those agents which are necessary to the digestion of food, and the consequent production of aliment: as, without a renewal of this salutary medium, the most wholesome diet will be productive of but little benefit.

It is asserted that substances have been discovered, which have enabled men to exist without proper food for a considerable length of time; and as a proof of this assertion, the following instance of an extraordinary powder, which was given to six pensioners of the Royal Hospital of Invalids at Paris, is recorded in the Gentleman's Magazine for January, 1755. It is supposed to consist of Turkey corn, roasted, powdered, and mixed with a small quantity of sea-salt: six ounces of this composition, with less than a pint of water, afforded sufficient nutriment for one person for twenty-four hours. No other provision was taken for fifteen days, during which time, it is said, these invalids continued well and hearty, though one was seventy years of age, and the other five were young men, who had lost some of their limbs. None experienced any inconvenience, either from faintness or hunger; several of them being employed in such bodily exercises as were suited to their years; and they frequently did not eat the whole of their allowance. To prevent any deception, they were constantly guarded by a centinel.

Previous to its administration, the powder was prepared in the manner as follows: six ounces of it were shaken by degrees into boiling water, and briskly agitated with a spoon; after having acquired the consistence of a thin panada, it was fit for use. The invention of it is ascribed to M. Bouch, late surgeon-major of a regiment in France. It is recommended to an army on forced marches, a besieged garrison, and to the poor, at a time of scarcity, or when other provisions cannot be easily procured.

Among the articles of diet affording aliment in an uncommon proportion, we may enumerate the following, to which we refer the reader, under the heads of Arrow-Root, Rice, Sago, Salop-Powder, Tapioca, &c.—See also Food and Drink.

Alisma Plantago, L. See Greater Water Plantain.

ALKALIES, in chemistry, signify those substances which possess the following properties: viz. they are, 1. incombustible; 2. incapable of converting a vegetable blue to a green colour; 3. they manifest a hot and caustic taste; and, 4. are soluble in water.

Alkalies are divided into two kinds, fixed and volatile. The fixed are subdivided into vegetable and mineral; the former being the production of burnt vegetables in the open air; and the latter have sometimes been found native in the earth, though we generally obtain our soda by the calcination of marine plants, chiefly from the different species of the glass-wort, or *Salsola*, L. as well as from other saline vegetables growing near the sea-shore. — See the article Barilla.

Both the fixed alkalies endure a very intense degree of heat, without dissipation, and are used in the composition of glass: the volatile are produced by distillation from animal substances; in their pure state they are invisible, and so pungent to the smell, that they cannot be approached without great danger.

All vegetable substances contain fixed alkali, in greater or less proportion. M. M. Deyeux and Vauquelin have proved by recent experiments, that one pound of the ashes of horse-chesnuts yields nearly six ounces and a half of pot-ash; nay, the same quantity of the burnt husks produced more than six ounces. But, according to an accurate analysis made by these chemists, the greatest quantity of vegetable alkali is contained in the fruit of the Spanish lilac, or *syringa vulgaris*, L. the ashes of which yield more than one-half of pure alkali, or in proportion of eight ounces and three drachms to a pound.

M. Jacobson, the editor of the German Technological Dictionary, asserts, that the dry or withered leaves of the beach-tree, or the *Fagus sylvatica*, L. afford the vegetable alkali in great abundance, insomuch that ten pounds weight of the ashes thence obtained, are equal to thirty pounds of common wood-ashes.—We have purposely mentioned the results of these experiments, as the vegetables alluded to may be readily procured, and substituted for the very expensive articles of pearl-ashes and soap. A farther account of useful substitutes will appear under the different heads of Soap, Soda, and Washing.

It is affirmed, that pestilential fluids are rendered harmless and inactive by alkaline substances; and Dr. Mitchill, of New-York, in two letters written to a young lady, has ingeniously and humorously described their good effects. As these refer to many articles of domestic economy, which are more or less composed of alkaline productions, we shall present our readers with an extract, nearly in the author's own words:—It is a stale and indelicate subject of jesting among men, how much time and labour are consumed by women, in scrubbing, scowering, whitening, and washing. These operations, however, are not performed for mere pleasure, but to prevent the conversion of impurities to infection; or to destroy it, if already produced. For this purpose, they employ pot-ash and its ley, soap, lime, calcareous earth, &c. to scower the porous materials of their floors and stair-cases; to purify garments that have become soiled or contaminated by long use, or wearing; and with good reason, as these saline substances are capable of drawing forth and rendering harmless, those animal exhalations which are ready to be converted into pestilential poison.—The ladies have indeed proved from long established experience, that "*infection is uniformly prevented and extinguished by the use of alkalies.*"

Dr. Mitchill also recommends the use of pot-ash cakes for children, to prevent the injurious effects of an acid upon their stomach, and mitigate the disorders to which their bowels are liable. He observes, that those infants who have been accustomed to eat cakes a little tinctured with this excellent ingredient, grow fat and healthy; and concludes with advising alkaline washes and powders as dentifrices; which, in his opinion, have been beneficial only in proportion to the alkali, of which they are partly composed.

ALKANET, Evergreen, or Bugloss; the *Anchusa sempervirens*, L. of eight species, the only one which is indigenous: it is represented in Sowerby's *Engl. Bot.* 45, p. 5—7.

The *Anchusa officinalis*, or greater garden-bugloss, is a native of the warmer parts of Europe; but will also thrive in Britain. The flowers of this species, which blow during the whole summer, have obtained the name of cordial flowers, as they moderately cool and soften the palate and stomach. They are much visited by bees;—the young leaves afford a good substitute for early garden vegetables, and the whole plant is an excellent fodder for cattle.—If the juice of the fresh flowers be boiled with a solution of allum, it yields a green colour, which is used for dying.

The *Anchusa lutea*, or *Onosma echioides*, L. is a native of France, Italy, Switzerland, Austria, and some parts of Russia. Its perennial and woody root is, as it were, externally varnished with a beautiful carmine colour; hence the females of the last-mentioned country steep it in oil, for the vain purpose of painting their faces.

Another species, the *Anchusa tinctoria*, L. is imported from the Levant, but unprincipled dealers frequently dye the common garden-bugloss in a decoction of Brazil wood, and substitute it for the genuine root, which, as obtained from Montpelier, is of a woody texture, externally blood-red, but internally white, without flavour, and of an acrid taste. DODONÆUS affirms that, when transplanted to a cold climate, it loses its red colour.

The Spanish wool, or *Charta hispanica*, is said to be prepared of this root: and RUGER, a late German writer, gives, in his "Pocket-book for Painters," the following directions for obtaining from it a beautiful *purple lacker*: take two ounces of the root finely powdered, and boil it for a few minutes in a lixivium made of pot-ash sufficiently diluted: and, after the liquor has grown cold, precipitate the colouring matter with a strong solution of roach-allum. The precipitate thus obtained must not be edulcorated or washed with water, as is done in similar processes; because this ablution would carry off too many of the colouring particles.

All the species of *Anchusa* may be propagated by seeds, which should be sown either in the spring or autumn, upon a bed of light sandy earth; and when the plants are strong enough to be removed, they should be planted in beds two feet distant from each other, and watered, if the season require it, till they have taken root. The alkanet reared in this country, is greatly inferior to that which is imported from the Levant.

ALL-HEAL, CLOWN'S, or MARSH WOUNDWORT, the *Stachys palustris*, L. is an indigenous plant, growing on the sides of rivers and lakes, in low, moist grounds, and sometimes in corn fields. It is represented and described in CURTIS's *Flora Londinensis*, pl. 8, p. 248.

This plant has a fetid smell, and bitter taste. Formerly it was employed in medicine as a vulnerary; but at present we shall confine our account to its economical purposes.

LINNÆUS, the illustrious author of the prevailing system of botany, informs us, in his account of esculent plants, that the creeping roots of the all-heal are sought after with avidity by hogs; and that, from their farinaceous nature, they would well repay the trouble of collecting and converting them into flour, for the purpose of making bread. In the present distressing condition of the industrious poor, we feel it our duty to take particular notice of all such substitutes as would, if properly and timely resorted to, in a great measure tend to avert or relieve a national calamity.—See BREAD.

Allium. See GARLICK.

ALLSPICE, *Pimento*, or Jamaica pepper. The berry, in its smell, resembles a mixture of cinnamon, nutmegs, and cloves, whence it has derived its name. It is milder than the East India pepper, and, when employed in whole grains, makes an useful ingredient in broth, and stewed dishes. In medicine, it forms the basis of a distilled water, a spirit, and an essential oil; in which different forms it is efficaciously employed as an aromatic, for cold and phlegmatic habits.—See the article Spices.

ALMANACK, a term derived from two Arabic words, *al* and *manack*, a diary; and is, as its name imports, a table or register containing a calendar of days and months, the rising and setting of the sun, the age of the moon, and the eclipses of these luminaries. It is also used to foretell the change of seasons, the state of the weather, the ebb and flow of the tide, &c.

Almanacks are much esteemed by the superstitious Arabians, who never sow, reap, plant, travel, or, in short, undertake any enterprize, without consulting them. Since their introduction into Europe, about the middle of the fifteenth century, they have also been adopted in this country, where they generally are interspersed with a number of astrological rules and regulations. To these have been added, various astronomical, meteorological, chronological, political, and economical articles, but they are seldom selected with critical discernment, or adapted to moral and physical improvement.

A great number of such diaries are annually printed in Britain; and we understand, that of the celebrated *Moore's Almanack*, notwithstanding all the superstitious notions perpetuated in this popular book, not less than 400,000 copies are, every year, ushered into public notice.—It is, therefore, sincerely to be wished, that such publications as are addressed immediately to the bulk of the people, may in future be rendered the vehicles of more useful information. Hence we presume to remark, that an annual publication, conducted upon the plan of *Poor Richard's Almanack*, in Pennsylvania, would be attended with great advantages, both to the husbandman and mechanic, in this country. The great Franklin, who is said to have edited that popular work for many years, furnished it with various sentences and proverbs, principally relating to subjects of industry, domestic economy, and frugality.

ALMOND, a tree, eminent both for its fruit, and for the ornament which it affords to a shrubbery. It is the original of the ancient genus *amygdalus*, and by the botanic characters of the flowers, comprehends also the peach and nectarine. Botanists admit but of one real species of the common almond tree, which they term *Amygdalus communis*.—Not being indigenous, we shall omit its particular description, and proceed to state the properties and effects of its fruit on the human body.

Sweet almonds are supposed to afford but little nourishment, and are not easily digested, unless thoroughly triturated. Six or eight of them, peeled and eaten, sometimes give immediate relief in the heartburn. In medicine, they are chiefly used for preparing emulsions, as they abound not only with an oil, but likewise with a mucilage fit for incorporating oil and water. We have already observed that this fruit is difficult of digestion, on account of the oil it contains, which quickly becomes acrid in the stomach; hence it is particularly improper for bilious constitutions. The various preparations of almonds are liable to similar objections; and it is therefore absurd to give almond milk as a common diet-drink to febrile patients; for, as it consists entirely of oily and insoluble parts, it not onl heats and vitiates the stomach, but at the same time occasions an accumulation of bile.

Almonds, as well as nuts, ought to be eaten only while fresh, and without their skins. They should be well chewed; for every piece swallowed entire, is indigestible. The use of a little salt, however, renders them miscible with our fluids, as a saponaceous mass; but, if indulged in to excess, they are productive of alarming, and sometimes fatal disorders.

The expressed oil of bitter almonds, is, in cases of poison, recommended preferably to all others; but care must be taken not to use the chemical, instead of the natural oil, as the former is itself a poison.

Bitter almonds are now generally disused. They have been found to destroy some kinds of animals; hence modern physicians prescribe them with more caution; they are, nevertheless, frequently employed, for making orgeat and other liquors, without producing any bad effect.

ALMS, or charitable donations to the poor. In the early ages of Christianity, this term was employed in a more general sense, and signified as well those donations which were given for the subsistence of the ecclesiastical establishments, as those which were appropriated to the repair of churches, and the relief of the indigent.

Alms-giving forms an essential part of all religions. It is particularly enjoined by the Mahometans; and the *Alcoran* represents it as the only means of ensuring successful prayer. The Christian system constantly recommends the active practice of benevolence, and the frequent distribution of alms.

Hence Dean SWIFT very emphatically remarks, that "the poor beggar has a just demand of an alms from the rich man; who is guilty of fraud, injustice, and oppression, if he does not afford relief, according to his abilities."

ALMS-HOUSES are asylums for the support and maintenance of a certain number of poor, aged, or infirm persons during their lives. When these institutions are of a *private* nature, and limited in their extent, they are certainly beneficial to society; yet it may on the whole be doubted, whether such *public* establishments, especially as they are generally managed under the absolute controul of rapacious trustees, do not in a great measure tend to relax the springs of industry, and encourage habits of indolence. For, by accustoming people rather to resort to eleemosynary sources, than exert their own strength and abilities, they cannot fail to degrade the moral feelings of human nature, and to destroy that independence which constitutes its noblest support.—See the articles CHARITY and HOSPITALS.

ALOE is a beautiful exotic plant, the flowers of which grow in umbels on the tops of the stalks, are of an elegant red colour, and appear in the months of August and September. It consists of ten species, all of which are propagated either by off-sets, or by planting the leaves. The proper earth for this vegetable, is one half of garden-mould, or fresh earth dug from a common; the other half consists of an equal proportion of white sea-sand, and sifted lime-rubbish. This mixture should be made, at least, six or eight months previous to its use. The common aloe will live in a dry green-house in winter, and in summer may be placed under shelter, in the open air; but should have very little water, and none on the stem of the plant: the other species require to be kept in an airy green-house, in which there is a stove to make a fire in cold weather.

Among the Mahometans, and especially in Egypt, the aloe is held in high estimation, and even dedicated to religious offices. These superstitious people believe, that it prevents evil spirits from entering their houses: for this purpose, both Christians and Jews place it over their doors; and whoever returns from a pilgrimage, exhibits it as an emblem of his having performed that holy journey.

Its properties are various; and applied to numerous purposes, both medicinal and domestic. The leaves of the Guinea-aloe, as described by M. Adamson, in his voyage to Senegal, are employed in making very good ropes, not liable to rot in the water.

Dr. Sloane describes two sorts of aloe, one of which is used for fishing-lines, bow-strings, stockings, and hammocks: the other produces leaves capable of holding rain-water.

In Mexico, there is a species of aloe called the *Maguei*, which is applied to almost every purpose of life. Besides making excellent hedges and inclosures for their farms, its trunk serves as beams for the roofs of their houses, and its leaves instead of tiles. From this plant, the natives make their paper, thread, needles, and various articles of clothing and cordage; while, from its copious juice, they extract wine, honey, sugar, and vinegar. Of the trunk, and thickest part of the leaves, when baked, they prepare an excellent dish. It is likewise employed by them in several diseases, but especially in those of the urinary passages.

In this country, aloe is principally known as a medicine in the form of an inspissated juice, which consists of three sorts: 1. the *Aloe perfoliata*, or Socotrine Aloe; 2. the *Hepatica*, Barbadoes, or Common; and 3. the *Caballina*, fetid or Horse Aloe. The first of these is the purest, and is brought from the island of Socotora wrapt in skins. It is of a glossy surface, and in some degree pellucid, of a yellowish-red colour, with a purple cast, and when reduced to powder, of a bright golden shade. In winter, it is hard and friable, but in summer pliable, and grows soft, when pressed between the fingers. Its taste is bitter, accompanied with an aromatic flavour; the smell is not unpleasant, and slightly resembles that of myrrh.

Aloe is considered as a good opening medicine for persons of a lax habit, and those whose stomach and bowels are loaded with phlegm or mucus, and also for worms; because, while it carries off viscid humours, it serves by its stimulating qualities to strengthen and brace the system. When given in small doses of a few grains, repeated at intervals, it not only cleanses the alimentary canal, but tends also to promote the menstrual discharge in women: hence its use in the green sickness, and all female obstructions. We must, however, observe, that, though it be a good stomachic laxative, it ought to be employed with great precaution, being an acrid and heating medicine, and therefore not proper in bilious complaints, or in a febrile state of the body. Its continued use sometimes produces the piles, and habitual costiveness. When given in substance, without any mixture, it frequently adheres to the coats of the intestines, where it occasions griping, and uneasiness:

neſs: for which reasons, and in order to destroy its viscid properties, it should be previously combined with some saponaceous or resolvent medicine, such as a small quantity of alkaline salts, the yolk of an egg, Castile soap, or mucilaginous vegetable extracts.

We have purposely given a more minute account of the medicinal effects of this plant, than the limits of our work will admit on similar occasions: this exception, however, has not been made with a view to encourage the sale of those aloetic preparations, so generally known and vended, under the name of "Anderson's Pills;" which, like most patent and quack medicines, have unquestionably contributed to increase the number of patients among those credulous victims, who are frequently obliged to seek relief in public dispensaries and hospitals. Convinced of the mischievous tendency thence resulting to the community, we devoutly hope that the wisdom of the legislature will, at length, be effectually directed to the suppression of those *destructive* practices, the pretended success of which, we almost blush to say, is *exultingly* related in our daily prints!

With respect to the economical purposes to which the aloe may be rendered subservient, we shall in this place relate only the principal.

It is asserted by an anonymous writer, in the Gentleman's Mag. for July 1754, that a varnish made of the extract of the hepatic aloe, turpentine, tallow, and white lead, or Spanish brown, when applied to the bottoms of ships, is the most effectual means of preserving them from the *sea-worm*: the discoverer remarks, that a plank covered with this mixture, was sunk with a proper weight and ropes, together with another in an unprepared state, both in an equal depth of salt-water, where the worm abounded; and, upon raising them, after they had remained there from five to eight months, the former was perfectly sound and untouched, while the latter was eaten to a honey-comb. This hint was adopted by a gentleman at Bermudas, who observed the inhabitants employ a few sliced leaves of the plants, from which the hepatic aloe is extracted, in addition to the oil and tallow, which are boiled together, and used in careening their fishing-boats.

Another valuable property of the horse-aloe, beside its being an excellent purgative for horses, is its bitter principle, which renders it eminently useful in watery solutions, not only for preserving tender plants from the depredations of vermin and insects, but likewise for preventing putrefaction in certain vegetable and animal bodies, such as dried plants, stuffed birds, quadrupeds, &c. Proper care, however, should be taken, that solutions or mixtures made with aloe be not exposed to be swallowed by dogs, cats, or other domestic animals, as to them the consequences would be fatal.

Several species of this useful plant have also been employed for manufacturing a *cloth*, resembling linen in its texture, and *paper* of various quality. Clusius made shirts of it at Madrid; and Bourgoing, in his travels through Spain, informs us, that the natives of that country manufacture their horse-bridles from the filaments of aloe-leaves. Minasi, an Italian, produced from similar materials, different kinds of coarse and fine paper.

Lastly, we find, in the "Experiments and Observations" published by POERNER, a creditable German writer, in 1772, that a watery decoction, made of the resinous gum of the aloe, without any farther addition, produces a beautiful dark cherry-brown colour on woollen-cloth, by simple immersion. This fact may be easily ascertained by dyers.

Alopecurus pratensis, L. See MEADOW FOX-TAIL.

Alopecurus agrestis, L. See SLENDER FOX-TAIL.

Alsine media, L. See COMMON CHICKWEED.

Althæa officinalis, L. See MARSHMALLOW.

ALUM is a concrete salt, transparent, and of a very austere and astringent taste. It is in general a chemical preparation, being rarely found in a natural state, or freed from other ingredients. In Egypt, Sardinia, Spain, Bohemia, &c. it is said to be sometimes discovered in crystals.

There are various kinds, but that which is called the Roman alum, is preferable to any other. This is usually to be found in small crystals, and of a reddish colour, probably owing to a small quantity of calx of iron, which, however, does not in the least impair its qualities. The other kinds contain a proportion either of vitriolated tartar, or sal ammoniac.

In medicine, it has been considered as an astringent, and is of great service in restraining hemorrhages, and other immoderate secretions. It is likewise externally used in lotions and eye-waters: and one scruple of burnt alum has been found beneficial in removing violent colic-pains arising from flatulency, bile, or great relaxation of the bowels; but in other cases it may prove hurtful.

It is used for various purposes by dyers, to fix different colours upon cloth; in the making of candles, to give them a gloss and firm consistence; wood soaked in a solution of alum, does not readily take fire; and paper impregnated with it, is the most proper for the preservation of gunpowder, as it also excludes the moisture of the air. Tanners employ it to restore the cohesion of those skins which have been almost entirely destroyed by lime; and vintners in fining their wines, &c. Fishermen dry their cod-fish by means of it; and it is asserted, that bakers generally use it as an ingredient in bread: the truth of this assertion, however, has been much questioned, and the sole reason ascribed for its use, is, that corrupt flour, being mixed with good, thus acquires a proper degree of cohesion, as the aluminous particles equally pervade the whole mass, and render it of a due consistence. Although some writers have maintained, that this styptic salt "is entirely innocent, and now seldom used" in the process of making bread, yet we have but too much reason to believe the contrary. The English translator of Tissot's excellent "Advice to the People in general," &c. very pertinently remarks, that the abuse of alum, and other pernicious materials, introduced by *our* bakers, may too justly be considered as one lamentable source of the numerous diseases of children. The Monthly Reviewer of that book, for July 1765, adds, with equal justice, the following commentary: 'Hence obstructions in the bowels and viscera, feebleness, slow-fevers, hectics, rickets, and other lingering and fatal diseases.'

To discover such unlawful practices, requires no chemical skill: on macerating a small piece of the crumb of new-baked bread in cold water, sufficient to dissolve it, the taste of the latter, if alum has been used by the baker, will acquire a sweetish astringency. Another method of detecting this adulteration, consists in thrusting a heated knife into a loaf, before it has grown cold; and if it be free from that ingredient, scarce any alteration will be visible on the blade; but, in the contrary case, its surface, after being allowed to cool, will appear slightly covered with an aluminous incrustation. This method, we understand, is generally preferred in the experiments made by country-justices. It deserves, however, to be remarked, that a very small proportion of alum, such as a few grains to a quartern-loaf, cannot be productive of any serious effects. In relaxed and scorbutic habits, or to those persons who are troubled with flatulency, bilious colic, and jaundice, such *medicated* bread may be conducive to the recovery of health; while in others, of a plethoric constitution, and a rigid fibre, it cannot fail to aggravate their complaints. In short, such addition to a common article of subsistence is, to say the least of it, highly improper, and ought not to be intrusted to the hands of a mechanic.

One of the most important purposes, to which this concrete salt may be readily applied, is that of purifying and sweetening water that ha become fetid and unfit for use. On long voyages, or at a distance from clear rivers and wells, each gallon requires, according to its impurity, only from five to ten grains of calcined alum, and double or triple that proportion of powdered charcoal, in order to render the most offensive water perfectly sweet and pellucid: both ingredients, however, ought to be preserved in close vessels, or otherwise their efficacy will be considerably diminished.

Alum has also been tried in the boiling of salt, to render it of a firm consistence, but the good which was supposed to be derived from it, is now solely attributed to the effects of the slow and gentle heat, so that in this process it has of late been discontinued.

The manufacture of alum was first invented in the year 1608, and greatly encouraged in England, by Lord SHEFFIELD and other Gentlemen of the county of York. King JAMES the 1st assumed a monopoly of that article, and prohibited its importation.

Alyssum sativum, L. See GOLD OF PLEASURE.

Amaranthus Blitum, L. See SMALL RED BLITE.

Amaurosis. See GUTTA SERENA.

AMBER *(Succinum)* is a hard bituminous substance, possessing a subacid resinous taste, and a fragrant aromatic smell. It is the production of many countries, but the best sort is that which is found in various parts of England, especially in the clay and gravel-pits between Tyburn and Kensington, as well as behind St. George's hospital, near Hyde-Park Corner, where fine specimens of this concrete are occasionally discovered. Prussia possesses it in great abundance, and the king derives from this article alone an annual revenue of

26,000 dollars; on which account the late FREDERIC professed himself to belong to the trade of *amber-turners.*

Those parts of the earth which produce this bitumen, are generally covered with a soft slaty stone, and abound with vitriol. Its most remarkable properties are, that it attracts other bodies to its surface, such as paper, hair, wool, &c. and that it presents a luminous appearance in the dark. In its native form, under ground, it resembles various substances, such as pears, almonds, peas, &c.; but, when broken, leaves, insects, and other small objects, frequently appear inclosed: hence it has been supposed, that amber was originally in a fluid state, or that from its exposure to the sun, it became softened, so as to be susceptible of those impressions. As these insects are never found in its centre, but always near its surface, the latter seems the more probable conjecture. Animals of all kinds, are extremely fond of it, and pieces are frequently discovered in their excrements. Several centuries before the Christian æra, it was in high esteem as a medicine; and PLATO, ARISTOTLE, and other writers, have commended its virtues: among the Romans it was valued as a gem, and in the reign of NERO, brought in immense quantities to the capital, where it was highly prized by the fashionable ladies, who decorated themselves with trinkets made of that substance; a custom which is still prevalent at Munster in Westphalia, and other catholic countries, where it is converted into amulets, crosses, &c.

As a medicine, amber is at present but in little repute, though it is still given in *fluor albus,* hysteric affections, and in those diseases which proceed from debility. Formerly it was used in a variety of preparations, but of late, an aromatic balsam, a powder and an essential oil, are the only forms in which it is employed.

Lastly, this bituminous matter constitutes the basis of several kinds of varnish. It is used for the coating of various toys, for staining the *papier maché*, and for the varnishing of carriages; for which last purpose, however, it is more profitable to dissolve the gum copal. The following is a simple and efficacious recipe for making the *amber varnish.*

Melt the amber slowly in a crucible, till it becomes black; then reduce it to a fine powder, and boil it in lintseed oil, or in a mixture of this and the oil of turpentine.—See VARNISH.

AMBERGRISE, or Grey Amber, is a solid, opake, bituminous substance, of a greyish or ash colour, usually intermixed with yellow and blackish veins. This concrete is found floating on the sea, or thrown on the shores, and is produced in the greatest quantity by the Indian Ocean. It has been sometimes also discovered by fishermen in the bellies of whales, in lumps of various sizes, from half an ounce to one hundred pounds in weight. Hence it is supposed to be an animal production. CLUSIUS, however, asserts that it is an indurated and indigested part of the food collected by these fish, and forms a similar concretion with that of the *bezoar* found in the stomach of other animals. When pure, it softens between the fingers; melts into an oil, in a moderate degree of heat, and, in a stronger one, proves highly volatile. Slightly warmed, it emits a fragrant odour, and when set on fire, smells like amber. It dissolves, though with difficulty, in spirits of wine, and essential oils, but not in those which are expressed from vegetables, nor in water.

In Asia, and part of Africa, ambergrise is not only used in medicine, and as an article of perfumery, but also applied to the purposes of cookery, by adding it as a spice to several dishes. It is valued by the Turks as an *aphrodisiac*, and erroneously supposed to promote longevity.

In this country, it was formerly esteemed a cordial, and to be of great service in disorders of the head, and nervous complaints; but it now chiefly serves as an agreeable perfume, and is certainly free from many of those inconveniencies which usually accompany substances of this description.

Ambergrise may be considered as genuine, when it emits a fragrant smell, on thrusting a hot needle into its substance, and melts like fat, of an uniform consistence.

AMBURY, in farriery, signifies a tumour, or wart which is soft to the touch, and full of extravasated blood. It is a disorder incident to horses, and may be cured by the following method.

Tie a strong hair very tight round the part affected; and, after it has spontaneously fallen off, which usually happens in about eight days, sprinkle powdered verdigrise on the place, to prevent a return of the complaint. When, from its local situation, it cannot be tied, it may be either cut out with a knife, or burnt away with a sharp, hot iron; or, where this cannot be practised with safety, for instance, in sinewy parts, it may be removed by applying oil of vitriol, or corrosive sublimate to the tumour. During the cure, the animal must be kept quiet, and free from every exertion.

AMMONIA signifies a salt, of which there are two sorts, the native and the factitious. The former, described by Pliny and Dioscorides, was generated from the urine of camels, in the inns, or caravanseras, where the pilgrims, returning from the Temple of *Jupiter Ammon,* used to lodge: whence it derived its name. The latter is a chemical preparation, formed either of the acetous or muriatic acids, combined with volatile alkali. A salt nearly of the same kind is thrown out by Mount Etna. The ancient sal ammoniac was said to possess the properties of cooling water, and dissolving gold.

Great quantities of this concrete were formerly brought from Egypt, where it was originally prepared by sublimation, from the soot of animal dung; tho' at present we are principally supplied from our own manufactories, several of which are established in different parts of Britain; but that in the vicinity of Edinburgh is one of the most extensive.

Although the cheapest and most convenient method of preparing it is not generally known, yet it is conjectured to be chiefly formed of a combination of sea salt and soot. It is commonly crystallized in the form of large, round cakes, and sometimes in conical loaves. The best sort is colourless, almost transparent, and free from visible impurities. The taste of this salt is very sharp and penetrating. It dissolves in rather less than thrice its weight of water; and upon evaporating, a part of the liquor concretes again into thin shining spicules, or plates, like feathers. In frosty weather, these are remarkably beautiful, and resemble trees, plants, &c.

Sal ammoniac, when pure, promotes perspiration, and in some cases, increases the secretion of urine. A drachm of it, dissolved in water, if the patient be kept warm after taking it, generally proves sodorific. By moderate exercise in the open air, it beneficially operates on the kidneys; given in a large dose, it proves aperient; and in a still larger, acts as an emetic.

As a cooling and diaphoretic medicine, the sal ammoniac dissolved either in vinegar and water, or combined with small doses of the Peruvian bark, has often been attended with the best effects, when taken in fevers, and especially in intermittents, after the intestinal canal has been properly evacuated. Mr. C. LYNAM, a medical practitioner in the metropolis, has formerly favoured the Editor of this work with an account of a cheap and expeditious manner of saturating the common solution obtained by dissolving this salt in vinegar, with fixed air, or *carbonic acid gas*; which is a valuable addition to that liquor. His method is in effect as follows: take one ounce of pure sal ammoniac, and one pint and a half of distilled vinegar; put the latter in a decanter provided with a close glass-stopper; then introduce the salt, previously broken into lumps, but not too small; as by plunging it too suddenly into the liquor, the extrication of the gas would be too quick, and a quantity of it be dissipated. Next, the stopper of the bottle should be tied over with a piece of leather, and the whole be left undisturbed. It would farther be useful, to add, on the top of the bottle, some weight or pressure, by which means the combination of the carbonic acid gas with the water will be greatly facilitated. After having stood a few hours, the ammonia will be dissolved, and the carbonic acid absorbed by the liquor.

By this simple process the acetated water of ammonia becomes strongly impregnated with fixed air, while it is almost entirely deprived of that disagreeable taste which is peculiar to this medicine, when prepared in the usual way.

Mr. LYNAM speaks from experience, of the superior qualities this preparation possesses as a febrifuge; beside the very great advantage, that it tends to keep the bowels open, even under the immediate influence of opiates. It likewise, generally, agrees with weak and irritable stomachs, which can retain scarcely any other medicine.

This salt has also been employed externally in lotions and embrocations, for scirrhous and other indolent tumours; for removing warts and other excrescences, and in gargarisms, for inflammations of the tonsils.

Ammonia pura, or the caustic vegetable alkali, possesses uncommon alexiteric powers, in the cure of persons bitten by snakes, and other venomous animals. Sixty drops of it, sufficiently diluted with water, make a moderate dose, which ought to be repeated according to the urgency of the symptoms. At the same time, the wound should be washed with a similar mixture.

It is positively asserted, that such treatment has been attended with uniform success, when the patient was able to swallow the medicine.

AMMONIAC is a concrete, gummy-resinous juice, usually brought from the East Indies in large masses composed of lumps or tears of a milky colour, but on exposure to the air, it quickly acquires a yellowish appearance. Hitherto we have no certain account of the plant which affords this juice, but it has, and with some probability, been asserted, that it is a species of the *ferula*, from another species of which is also produced the *asa fœtida*;—it is said to grow in Nubia, Abyssinia, and the interior parts of Egypt.

This gum has a nauseous sweetish taste, succeeded by a sensation of bitter; and a smell somewhat resembling, but more grateful than, galbanum. When chewed, it softens in the mouth, and becomes of a white colour. It may be partially dissolved, in water, or in vinegar, with which it assumes the appearance of milk, but the resinous part, amounting to about one half, subsides when suffered to rest. A similar composition, but much inferior in virtue, is frequently sold under the name of strained gum ammoniac. Those tears which are large, dry, and free from little stones, or other impurities, should be selected and prepared for internal use; the coarser kind may be purified by solution and straining, but unless this be carefully managed, it will lose a considerable portion of its fine and more volatile parts.

In medicine, it is prescribed for removing obstructions of the abdominal viscera; in hysterical complaints occasioned by the deficiency of periodical evacuations, and in long and obstinate colics, proceeding from viscid matter lodged in the intestines. A solution of it, in vinegar of squills, has proved of considerable service in the humid chronic asthma of the aged and decrepit. The most convenient form for its exhibition, is that of pills; a scruple may be given every night, or oftener. Externally it is used for softening and ripening indolent tumours; and with a mixture of squill vinegar, forms a plaister which has sometimes been successfully recommended for white swellings. A solution of it, in penny-royal water, is usually kept in the shops, under the name of ammoniac milk.

AMPHIBIOUS ANIMALS are so called, on account of their living partly on land, and partly in water.

We cannot, consistently with our plan, enter into a disquisition respecting their nature and functions; and shall therefore content ourselves with observing, that in their structure, they are principally distinguished from land-animals, by having red cold-blood, and instead of lungs, either gills or *branchiæ*, as is generally observed in snakes, eels, and fish, which chiefly inhabit the water. Sometimes, however, they have the oval hole open between the right and left auricles of the heart; and, in many, the arterial canal is also free. This is a distinguishing character of the *phocæ*, or such animals as enjoy their chief functions on land, for instance, otters, beavers, frogs, crocodiles, some kind of rats, birds, &c. While these remain under water, where they may safely continue for several hours, their respiration is interrupted; and the blood, not finding a free passage through the pulmonary artery, rushes through the hole from the right to the left auricle, and partly through the arterial canal; having but a short course to the aorta, the largest of all the blood vessels, and thence circulating to every part of the body. But, on rising to come ashore, the blood makes its way again through the lungs, as soon as the animal begins to respire.

As in all land animals a large portion of the mass of blood continually circulates through the lungs, which would be stopped, if the free access of air were excluded; so we find in fish a great number of blood-vessels passing through the gills, which must be perpetually wet, lest the blood should, in like manner, be checked, and consequently stagnate in its progress. Hence, when the latter are removed from their natural element, the *branchiæ* very soon grow crisp and dry, the vessels become corrugated, and the blood finds no outlet: likewise, when land-animals are immersed under water, or in any other manner deprived of respiration, the circulation ceases, and the animal inevitably dies.

Inquisitive physiologists have advanced, that *man* may, by art, be rendered *amphibious*, and enabled to live under water, as well as the beaver, or turtle; because the fœtus *in utero* lives without air, and the circulation is continued by means of the oval hole: if, therefore, this important opening could be preserved after the birth of the child, the same useful faculty might still remain.

This proposition is plausible; and we do not hesitate to declare, that in a *maritime* country, such attempts ought by all suitable means to be encouraged: for the advantages resulting from a successful application of the theory, would indeed be incalculable. In its support, and as an instance of the wonderful power we possess over the organs of respiration, it may be urged, that expert divers feel no inconvenience from remaining for several minutes under water, at a considerable depth; that individuals affected with asthma (among whom the writer of this article is a living evidence) have by mere force of habit, obtained effectual and permanent relief in that distressing complaint, by accustoming themselves from the commencement of it, to respire principally through the nostrils, whether in a waking or sleeping state; and lastly, that none of the interior organs possess a flexibility and power of expansion (unattended with loco-motion) equal to those of respiration.

After this short digression, we shall proceed to state the *means* by which that desirable faculty of respiring under water, may be acquired by the human subject.

It should previously be remarked, that the lungs of the *embryo* are compressed during its confinement, so that the pulmonary blood-vessels are impervious, and consequently the circulation must take place through the oval hole, and the arterial canal before-mentioned: hence the amphibious animal and the fœtus *in utero* are so far analogous in their nature; and though this hole generally closes at an early period of infancy, yet there are instances, well attested by anatomists, where it has been occasionally found not quite closed in human subjects, who have died at an advanced age. There is, however, one material difference between them: the fœtus never having respired, is sufficiently nourished by the maternal blood circulating through its whole body, which progressively grows, till its birth, without feeling the want of respiration during the whole period of pregnancy;

nancy; on the contrary, terraqueous animals having respired from the moment of their birth, cannot support life for any length of time without it; because both the hole and canal above alluded to would be closed, or at least constricted in them, as is the case in land animals, if they did not indistinctively, soon after the birth of the cub, instruct it in the exercise of that vital function. This is effected, by frequently carrying it into the water—a practice by which those passages are kept open during life, and the creatures enabled to procure that kind of food which is designed for them by the providential care of Nature.

Thus we may easily conceive that, in infants, the oval hole, by proper expedients and persevering exertions, might, *without much difficulty*, be preserved in an open state; for instance, by gradually accustoming young children, soon after their birth, to suspend their breath once, or oftener in a day, increasing the duration of the experiment with every attempt, so that the blood may at length be directed to circulate through its original passage, which, by several trials, cautiously repeated, would no doubt remain sufficiently lubricated, and never again be closed in the manner we generally find it in the deceased body.

That these are rational, and, we may venture to add, well founded conjectures, few will dispute; especially if it be considered that ordinary divers, without having been trained to this practice from early infancy, are capable of retaining their breath, and continuing much longer under water, than persons in whom that primitive organ of respiration, having never been exercised, has become unfit to act as an useful substitute for the lungs, while immersed under water.—Nay, there are well authenticated instances of persons who were in the full possession of the uncommon faculty here described: of others, we shall relate only that of a Sicilian, named the *Fish-Colas*, who possessed it to so eminent a degree, "that he lived rather after the manner of a fish than a man," in consequence of having from his youth, and by an assiduous practice, successfully acquired the habit of living in water, and thus effected a complete change of his physical nature.

We shall conclude this interesting subject with a short account of the alimentary uses, and properties, of amphibious animals.

In some countries, especially in old France and Italy, the legs of frogs were esteemed a delicate dish; but, in Britain, we regale our friends with the more delicious turtle. Yet these testaceous creatures, as well as animals of this class in general, and the West Indian guana in particular, contain an unusual proportion of fat; and ought, therefore, to be eaten not only with great moderation, but also with a considerable addition of salt, and acid: the former, for the purpose of neutralizing them into a saponaceous mass, which is most easily assimilated to our fluids; the latter, with a view to counteract their putrescent tendency, especially in warm seasons—both, in order to facilitate their digestion in the human stomach.

AMPUTATION is a term in surgery, and signifies the cutting off a limb from the body. It is sometimes rendered necessary, when a part is so diseased as either to be wholly useless, or threatening danger, if not removed. The cases in which this operation is usually performed, are, severe, compound fractures of the bones, attended with splinters; extensive lacerations, and contusions of wounds, with great loss of substance, and pouring forth a profuse discharge; wide-spreading mortifications; white swellings of the joints; cancers, or other incurable ulcers; exostosed, carious and distorted bones, &c.

Amputation is one of the most important operations in surgery, and has lately been brought to the highest perfection. Previous to the invention of the *tourniquet*, and the method of securing the blood-vessels from hemorrhages, by ligatures, it was rarely undertaken, and a great proportion of those who submitted to it, afterwards died. But in consequence of modern improvements, there seldom happens more than one death in twenty or thirty cases. In performing this operation, some particular cautions are necessary, viz. to make the incision at a proper place; to save a quantity of skin and cellular substance, sufficient to cover the muscles and bone completely, without being stretched; to prevent hemorrhages; to secure the arteries carefully, without including the nerves, or any of the contiguous parts; and to prevent the retraction of the integuments. Where part of a limb is either carried off, or much shattered, it will be necessary to amputate above the diseased surface, to ensure a speedier and safer cure. Should mortification have previously taken place, every other remedy ought to be timely and vigorously employed, till its progress be arrested; the first symptom of which will be, an inflamed circle separating the diseased from the sound parts: as soon as this has taken place, no time should be lost in resorting to the operation, lest the patient suffer from the absorption of putrescent matter, which readily occasions a hectic fever.

As the privation of a limb, and the great destruction of animal parts, are often attended with fatal consequences, nothing but extreme necessity, or the failure of all other means, can justify the choice of this formidable expedient. Some eminent authorities have altogether questioned its utility; and M. Bilguer, late surgeon-general to the Prussian armies, in his observations on this subject, declares, "that the cases in which amputation is necessary, are less frequent than has hitherto been supposed." He says, that during the late war, it proved unsuccessful in a variety of instances; and that he himself had, without resorting to operations, cured many patients, whose limbs had been so much bruised and shattered, that the ablest surgeons thought it advisable to employ their instruments.—See Tourniquet.

AMUSEMENTS, may be divided into public and private; and they are either of an active or sedentary nature. The former usually consist of balls, plays, entertainments, &c.; the latter, of the various diversions of cards, chess, back-gammon, and other games of chance or skill.

Those of an active kind ought always to be preferred, as they not only relieve the mind, when wearied with intense application, or depressed with grief; but by their agreeable variety, together with the advantages of air, exercise, &c. they are highly conducive to health. On this account, they are particularly serviceable to such persons as are subject to nervous and hypochrondriacal complaints, and to all those who lead a confined or sedentary life. Private amusements, on the contrary, are principally employed with a view to consume time, and frequently require more application than either study or business. Those amusements which afford the most violent exercise, and ought, therefore, to be pursued only by the healthy and robust, are hunting, shooting, cricket-playing, hand-ball, and similar games. When these are undertaken with the necessary adaptation to the strength of the individual, they promote perspiration and other secretions, expand the lungs, and give firmness and agility to the whole frame.—See GAMING, and THEATRE.

With respect to the amusements of children, we shall here only remark, that they may be compared to the labours and pursuits of adults; and that their influence, as well on health, as on the future inclinations and desires of the individual, is much greater, and more permanent, than is generally supposed. Hence we would advise parents and guardians to encourage no games, or play-things, which have a tendency to impair the constitution, or deprave the morals, of their offspring: of this nature are, improper and unnatural postures or gesticulations of the body; wanton jumping up and down high places; forcible exertions of muscular power, by lifting great weights and carrying ponderous bodies; the partial exercise of one arm or leg; sedentary plays of long duration; the standing for hours on their legs; musical wind-instruments; toys manufactured by common potters, or made of plaister of Paris; drinking-vessels of lead, pewter, white iron, bell-metal, or earthen-ware imperfectly burnt and glazed; play-things coloured or painted with noxious metallic preparations, such as verdigrease, orpiment, minium, as well as those devices and similar trifles produced by the confectioner, &c. &c.—On this interesting subject, which cannot fail to engage the attention of every judicious parent, we presume to refer the reader to a work lately published, from the German of Dr. STRUVE, entitled "*A Familiar Treatise on the Physical Education of Children*; with three Introductory Lectures and Notes, by the Editor of this Encyclopædia.

Amygdalus. See ALMOND.

Anagallis arvensis, L. See SCARLET PIMPERNELL.

Ananas. See PINE-APPLE.

Anchusa sempervirens, L. See EVERGREEN ALKANET.

ANCIENT LANGUAGES are those which are no longer spoken by a living people, such as the Hebrew, Greek, and Latin: they generally form a part of the education of those students who are intended for the learned professions. The utility of employing so much of the time of children at schools, in classical pursuits, and the study of the dead languages, has been much questioned: upon this subject, a humorous writer thus expresses himself: "Who can patiently endure to see persons so studiously going back two thousand years, in search of that perfection which lies so plainly still before them? To see men of sense and learning spending their whole time and attention about Æolic Digammas,

mas, the use of accents, or the meaning of a passage in HORACE, whilst, at the same time, they are suffering the finest language in the world, their own, to lie entirely uncultivated, unless by the laudable and occasional efforts of some private individual? Had the same been practised by the Greeks or Romans—had they studied nothing but Egyptian hieroglyphics, we might, at this day, have been obliged to travel to the Pyramids to read the Classics, whilst all the letters in the world would have been nothing more than the ill-imitated forms of men, animals, implements, &c. If we think that *they* did right, why do not we imitate their example? What possible reason can be alledged why the English might not, by similar care and attention, be made as good a language as either the Greek or Latin? Had we the address of SWIFT, or ADDISON, what a petition might we draw up in favour of our poor mother tongue, setting forth the many hardships she has long endured; the various insults and barbarous injuries she, from time to time, has suffered, and is still obliged to undergo, from the undutifulness of her own children," &c.

ANCIENT LEARNING signifies a thorough acquaintance with the writings of the ancients. A very great and illiberal prejudice has for some time since existed, which has induced us to give a constant preference to the ancients, for their genius, as well as their virtue. Their innocence, courage, and skill in writing, have been extolled as superior to our modern acquirements, and proposed to us as a standard of real perfection. Few authors, indeed, have been suffered to wear their laurels during life; these have been generally reserved, either to crown their statues, or entwine around their tombs. HOMER, in his days, was considered as a mere ballad singer; he is now a bard. SHAKSPEARE lived a precarious hireling. MILTON's divine poem lay long neglected, and was sold for a song. OTWAY lived and died in a corner; CERVANTES passed his days in poverty and obscurity, a living reproach to Spain; and the first of our English philosophers, the immortal NEWTON, was indebted to the officious kindness of a BARROW, to announce his merit to the world. Praise is slower than censure, because the former is retarded by envy and contention, which time alone, the final subduer of all things, can effectually remove.—'Tis the same in the moral as in the natural world: the sun exhibits the largest disk, when about to quit our hemisphere. The ancients have acquired a prejudicial hereditary admiration, and their only solid grounds of preference are, that they had the good fortune to come first into the world. Thus, by the laws of primogeniture, the eldest son inherits the patrimony, to the detriment of the rest of the family.

It cannot, however, be disputed, that the ancient writers have left us performances which would reflect the highest honour on any age, or nation; but to allow them the merit of exclusive excellence, is injustice to their competitors. A principle of tenderness has been urged as a plausible reason for entertaining a partiality for the ancients, and that the infant state of learning ought to experience the same flattering indulgence which is shewn to young children. The weakness of this plea is evident;

and candour obliges us to declare, that it is equally unjust and improper to consider the Greeks and Romans, with all their inaccuracies and defects, as perfect models of imitation. Many an ancient writer, whose real beauties have been justly admired, has also frequently been praised for his faults: thus his reputation has been sullied; instead of being indebted to his panegyrists, he has excited doubts and censures, where he had least deserved them.

The remarks made in the preceding article, may with equal propriety be applied to the present subject: but we shall content ourselves with observing, that those persons who have imbibed an early prejudice for the learning of the ancients, are generally deficient in active discernment, and incapable of ascertaining the merits of modern improvements.

ANCIENT TIMES are those which refer to remote periods of antiquity.

The degeneracy and corruption of modern times, as opposed to those of the ancients, have afforded a fruitful source of peevish invective, and an endless cause of querulous complaint, to both the learned and the illiterate. It has been the constant custom, at all times, to declare every succeeding age more wicked than the former; to represent the world as perpetually increasing in vice and folly; to lament the good old days that are past, and to anticipate nothing but misery from the future. Yet, however corrupt or vicious may be the age in which we live, let us but impartially compare the history of past times with those of our own, and we shall find no great reason to unite in the general outcry: on the contrary, it his highly probable, that our successors will attribute more virtues to us, than are possessed by themselves; though, perhaps, neither may be less virtuous, or more depraved, than the most celebrated nations of antiquity.

ANEMOMETER signifies a mechanical instrument for ascertaining the power and velocity of the wind.

Successful methods have been discovered to determine, with precision, the various properties of the air, its temperature, humidity, and weight, by means of the thermometer, the hygrometer, and the barometer; but, till lately, no attempts have been made to ascertain the force of the wind. Several instruments for this purpose have, indeed, been contrived; but they are in general more complicated, and less to be depended on, than the machine which we shall describe under the head of ANEMOSCOPE.

ANEMONE, or WIND-FLOWER, is the name of a plant chiefly distinguished on account of its beautiful flowers, which, by the Greeks, were supposed not to open till the wind blows; whence it has received its original name. LINNÆUS enumerates twenty-one species, of which the following five deserve particular notice, though the first of these is not indigenous.

1. *Anemone pratensis*, L. the dark-flowered, or Meadow Anemone, as described and represented in Dr. WOODVILLE's *Medical Botany*, vol. iii. p. 400, plate 148.—It produces beautiful dark violet, or almost black flowers, which blow in March and April*, and never expand.

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* Some botanical writers confound this plant with the *Anemone pulsatilla*, L. which is a distinct species.—The *Anemone pratensis*. L. is a native of Germany, where it flowers in the beginning of May: it was thence imported into this country, and first cultivated in our gardens by the late, and justly celebrated, MILLER, about the year 1731.

In its recent state, the meadow-anemone is almost flavourless, though its taste, when chewed, is extremely pungent, and corrodes the tongue and fauces; a property also manifested in a slight degree by the dried leaves. Hence we may conclude, that this plant possesses considerable medicinal virtues; a supposition amply confirmed, though often contested, by various practitioners of great respectability. Chemists, however, have proved by experiment, that one of its constituent parts is *camphor*, which has been obtained in the form of crystals. Hence it has been successfully employed in the cure of chronic affections of the eyes, especially in *gutta serena*, cataract, and opacity of the cornea. But, on account of its singular efficacy, it has generally been used in external applications, as an excellent aperient, detergent, and vulnerary medicine, with whose virtues the ancients were well acquainted, though they accounted for such effects from superstitious notions.

The juice of the anemone root, chewed in small quantities, stimulates the salival glands, and frequently affords sudden relief in excruciating tooth-ach, if it proceed from an acrimony or superfluity of humours, in phlegmatic habits. When boiled in rich wine, and applied as a cataplasm, it not only abates inveterate inflammations of the eyes, but also cleanses indolent and foul ulcers. Its leaves and stalks, slowly simmered in ptisan, and occasionally eaten, are said uncommonly to increase the maternal milk. If credit be due to the ancients, they also cure that frequent and destructive complaint of young females, called *chlorosis*; and, when beaten up with a mixture of bees-wax and turpentine, so as to form a pessary, tend to restore the *catamenia*. We doubt, however, whether the numerous other virtues, ascribed to this vegetable, be founded on truth; yet we believe that external applications of it, properly repeated, especially the leaves, bruised together with marsh-mallow root or other cooling herbs, may cure paralytic attacks in their commencement, herpetic eruptions, and even the leprosy; though we would not rely upon its efficacy in true *syphilis*, in caries or mortification of the bones, and still less, in cases of melancholy, or mania.

The dark violet leaves of this species, when boiled together with those of the *Serratula tinctoria*, L. or common saw-wort, and a proper addition of alum, afford, according to Professor PALLAS, an excellent green water-colour for landscape and other paintings.

2. *Anemone pulsatilla*, L. or Pasque Flower, so called because it generally blossoms about Easter, when it adorns some of our dry, chalky-hills. In April it bears beautiful bell-shaped flowers, of a purple or reddish colour. A description and representation of it may be found in SOWERBY's *English Botany*, p. 4, 5.—51.

Although this species may not be possessed of healing virtues similar to the preceding, yet it is asserted that its flowers are of great efficacy in curing inveterate ulcers, in man and cattle. As it is a poisonous plant, the inhabitants of Kamtschatka use its leaves for staining their arrows; which, unless the wound be immediately cleansed, and the communicated virus extracted by the mouth, are said to prove inevitably fatal: in like manner, these untutored savages destroy the whales which frequent their coast.

Both the flowers and leaves of

this species are employed by foreign dyers for green colours of various shades. From the expressed juice of the leaves, a green ink may be prepared; and if the florets only be used, it will be of a lighter shade, but from the whole flower, the colour will be much deeper. Relying on the authority of DAMBOURNEY, we shall add, that animal wool previously immersed in a solution of bismuth, acquires a pleasing light *vigogne* colour.

3. *Anemone nemorosa*, L. or the Wood-Anemone; another wild sort, bearing only one white, or sometimes purplish, flower on a plant.—See CURTIS's *Flor. Lond.* ii. 38.

In medicine, this plant may be usefully employed as a substitute for *cantharides*, or Spanish flies; for it produces not only a more speedy, but less painful, effect. Its juice is so extremely acrid, that it has been justly suspected to occasion the dysentery among cattle, and inflammation, accompanied with a discharge of bloody urine, in sheep. Hence the necessity of guarding these animals against the cause of distempers, which are frequently so formidable in their consequences, as to deprive the unwary husbandman of a great portion of his most valuable live stock.

4. *Anemone ranunculoides*, L. or the Yellow Wood-Anemone, which grows wild near King's Langley, Herts, and Wrotham, in Kent. It generally produces, in April, two flowers on one stalk, with rounder leaves than the preceding species. See p. 5. GERARD's *Herbal*, 383. 1.

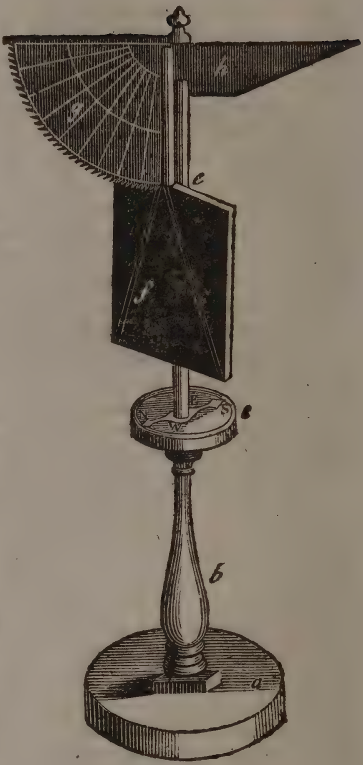
On account of its corrosive acrimony, the juice of this vegetable is also used by the inhabitants of Kamtschatka, for a similar deleterious purpose as is mentioned of the second species.

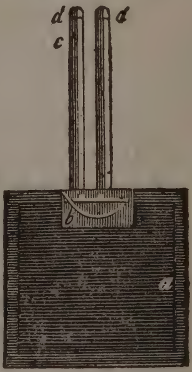
5. *Anemone Apennina*, or rather *Alpina*, L. the Blue Mountain Anemone, which grows wild in Wimbledon woods, likewise near Harrow; Luton-hoe, Bedfordshire; and Berkhamstead, Herts. See p. 4. CURT. *Flor. Lond.*

Its medicinal uses are, though in an inferior degree, similar to those before described.

ANEMOSCOPE, a mechanical instrument for determining the course and velocity of the wind. That part which exhibits the former, or shews from what point of the compass the wind blows, consists of an index, moving round an upright circular plate, like the dial of a clock; on which, instead of the hours, the thirty two points of the compass are represented. The index which points to the divisions on the dial, is turned by a horizontal axis, having a trundle-head at its outward extremity. This trundle-head is moved by a cog-wheel, on a perpendicular axis; at the top of which is fixed a vane, moving with the course of the wind, and imparting motion to the whole machine. The contrivance is extremely simple, and requires in its construction only, that the number of cogs in the wheel, and rounds in the trundle-head, be equal; because, when the vane moves entirely round, the index of the dial should also make a complete revolution. An anemoscope of this construction is placed in one of the turrets of Buckingham-house, the residence of Her present Majesty.

The anemoscope invented by Mr. PICKERING, and published in the Philosophical Transactions, No. 473, is a machine four feet and a quarter high, consisting of a broad and weighty pedestal, a pillar attached to it, and an iron axis, about half an inch in diameter, fastened into the pillar. Upon this axis turns a wooden tube; at the top of which is placed a vane, of the same materials, twenty-one inches long, consisting of a quadrant, graduated, and shod with an iron ring, notched to each degree; and a counterpoise of wood on the other, as represented in the figure. Through the centre of the quadrant runs an iron pin; upon which are fastened two small round pieces of wood, serving as movable radii to describe the degrees upon the quadrant, and as handles to a velum or sail; the pane of which is one foot square, made of canvas stretched on four battens, and painted. On the upper batten, next to the shod rim of the quadrant, is a small spring, which catches at every notch, corresponding to each degree, as the sail may be raised on the pressure of the wind, and thus its falling back prevented, when the force of the wind decreases. At the bottom of the wooden tube is an iron index, which moves round a circular piece of wood fastened to the top of the pillar, on the pedestal, where the thirty-two points of the compass are described. We have annexed a representation of this machine: *a* is the pedestal; *b*, the pillar on which the iron axis is fitted; *c*, the circle of wood representing the points of the compass; *e*, the wooden tube upon its axis; *f*, the velum; *g*, the graduated quadrant; *h*, the counterpoise of the vane. The subjoined figure represents the velum, which may be taken off: *a* is the plane of the velum; *b*, the spring; *cc*, the wooden radii; *d,d*, the holes through which passes the pin, in the centre of the quadrant.





This instrument serves the following useful purposes:

1. Having a circular motion round the iron axis, and being furnished with a vane at the top, and an index at the bottom, as soon as the artificial cardinal points described on the round piece of wood on the pillar are fixed to the corresponding quarters of the heavens, it faithfully points out the quarter from which the wind blows.

2. Being furnished with a velum, or sail, elevated by the wind, along the arch of the quadrant, to an height proportionate to the power of the column of wind pressing against it, its relative force and its comparative power, at any two times of examination, may be accurately taken.

3. By means of a spring fitted to the notches of the iron, with which the quadrant is shod, the velum is prevented from returning upon the fall of the wind; and the instrument, without the trouble of watching it, ascertains the force of the highest blast, since the last time of examination.

This machine may be confidently depended upon, as the velum is hung so nicely, that it is susceptible of the most gentle breeze, and will also describe the force of the wind in a violent storm. There is, however, reason to apprehend, that by exposing the anemoscope to all winds, especially to irregular blasts and squalls, for a length of time, it may become inaccurate. The observer ought, therefore, to take the tube with its vane and velum, in his hand, with a view to learn the force of the wind; and, after having made his observation, he should return with the machine into the house, till the violence of the storm subside.

ANEURISM, in surgery, signifies a throbbing tumor, occasioned by the dilatation or rupture of an artery: it consists of three kinds, viz. the true or encysted, the false or diffused, and the varicose.

The true aneurism, when situated near the surface of the body, produces a tumor, at first small and circumscribed, but, when pressed by the finger, it manifests a distinct pulsation. By degrees it increases, and becomes more prominent; still, however, the patient does not complain of any pain. As it grows larger, the skin turns more pale than usual, also more phlegmonous, or swollen, and at length assumes a livid and gangrenous appearance. A bloody serum now oozes through the integuments; the skin cracks in several places; and the artery, being deprived of the usual resistance, discharges its blood with such velocity, as to occasion almost instantaneous death.

The false aneurism consists of a wound or rupture of an artery, and, by the extravasation of blood, produces a swelling of the contiguous parts. If not improperly treated by constant and close pressure, it generally remains nearly of the same size, for several weeks. Instances have occurred, where the blood has diffused itself over the whole arm in a few hours; as, on the contrary, swellings of this kind have been months, nay, even years, in arriving at any considerable size.

The varicose aneurism is that which arises from the puncture of an artery, and sometimes happens in blood-letting. This circumstance, it is hoped, will point out the necessity of persons applying to regular practitioners, who are acquainted with the situation of the blood-vessels, and not employing, as is too frequently the case, ignorant and unskilful pretenders, for the performance of this important operation: soon after the injury has been committed, the vein which immediately communicates with the wounded artery, begins to swell, and gradually to enlarge. Upon pressure, the tumor disappears, because the blood contained in it is pushed forwards in its circulation to the heart; and when large, there is a singular tremulous motion, attended with a hissing noise, as if air were passing through a small aperture.

The causes which generally produce aneurisms, are a peculiar predisposition of the arteries, when they are in a relaxed state; a partial debility of their coats; excessive bodily exertions; stooping, and lifting great weights; acrid matter contained in a neighbouring sore; intemperance, &c. Where they arise from any external accident, an operation may be attended with success; but, in all other cases, art can afford but little assistance.

In a complaint of this nature, it is presumed that the earliest application will be made to professional men; and as the narrow limits of this work do not permit us to enter into a more minute investigation, we shall close this article with describing a new method of treating an aneurism, recommended by Mr. Lambert, surgeon at Newcastle upon Tyne, in a letter to Dr. Hunter. This was successfully practised, by passing a steel pin, one-fourth of an inch in length, through the lips of the wounded artery, and then securing it in the same manner as in the operation for the hare-lip, by twisting a thread round it. It was performed on the 15th of June, 1763, and on the 19th of the following month, the patient was dismissed, perfectly well; the pulsation of that arm remaining nearly as strong as in the former.

Anethum Fœniculum, L. See Common Fennel.

ANGELICA, is a plant of which there are seven species, though only two of them may be ranked among the indigenous.

1. *Angelica Archangelica*, L. or the Garden Angelica, is a large umbelliferous plant, scarcely a native of Britain; for, according to the late Dr. Withering, the only place where it grows without culture is, Broadmoore, about seven miles N. W. from Birmingham.—An accurate botanical description and delineation of it may be seen in Dr. Woodville's *Medical Botany*; vol. i. p. 138. pl. 50. The stalk of this magnificent plant, when properly cultivated in a moist soil, rises to the height of seven or eight feet; its flowers are of a greenish white colour, or sometimes yellow.

Every part of this useful vegetable, the root, stalk, leaves, and seeds, partake of the aromatic properties; whence the Germans denominate it angel-root, or breast-root, being one of the most spicy plants of European growth. Its resinous root, and the seeds, are chiefly esteemed in medicine, and the former, when fresh, affords by distillation a strongly fragrant spirit, and an essential oil, in the proportion of a whole drachm, and upwards, from one pound. A tincture made of one ounce digested in twelve ounces of proof spirits, yields, on evaporation, two drachms of a very pungent and spicy extract. This is generally preferred by the Medical College of Berlin; a valuable member of which, the late Dr. Gleditsh, gives the following account of its effects:

Fifteen grains of this extract, which are equal to one ounce, or two table-spoonfuls, of the tincture, diluted with water, and taken three times or oftener in a day, prove a gently stimulating medicine, well calculated to strengthen the solids, and especially serviceable for dispelling flatulency, removing pectoral complaints, and affording effectual relief in hysterics. The oily-spirituous and resinous part of it, tends to resolve viscid humours, while its gummy and balsamic constituents beneficially act on the fluids. Being very mild in its operation, the angelica deserves the preference to many other roots of this nature, and may therefore be usefully employed in flatulent colics, obstructions of the breast, and uterus, malignant fevers, and the true scurvy, in doses of two drachms in substance, conveyed either in tea, or mild wine. Externally it may be applied to scorbutic gums; and, when boiled in water, it affords a good gargle for swellings of the throat and fauces, as well as for cleansing ulcers. It may farther be used with advantage in a bruised state, as an ingredient in cataplasms and fomentations on the abdomen, to relieve painful distensions of the bowels, or to strengthen a weak and disordered stomach, if the patient at the same time pay proper attention to diet and regimen.

2. *Angelica sylvestris*, L. or Wild Angelica, is a much smaller plant, of a thinner and less succulent stem than the former. It grows in marshy woods and in hedges, flowers in June or July, and is represented in Gerard's *Herbal*, 999. 1.

This species, however, possesses, but in an inferior degree, the medicinal properties of the preceding, which may always be more readily procured.

Both the garden and wild angelica, delight in a moist soil; the seeds should be sown immediately after they are perfectly ripe. As the leaves of the young plants spread wide, and require much ground, they should be transplanted at a considerable distance, when they are about six inches in height.

Unless the roots be thoroughly dried, they are apt to grow mouldy, and be preyed upon by insects: hence the necessity of keeping them in a dry place, which should be frequently aired. It has been suggested, for the preservation of these useful roots, that they should be dipped in boiling spirit, or exposed to its steam, in a dry state. We believe, however, that this expensive process may be rendered unnecessary, by gathering the root in a dry season, suspending it in an airy room, upon threads, and guarding against the attacks of vermin.

Cattle are exceedingly fond of eating the fresh spring leaves of the wild angelica, which to them are a good cleansing and strengthening medicine: bees visit its white flowers, and extract from them a more balsamic honey. Hence its growth should be encouraged, and even artificially promoted, especially as it is one of those plants which have lately been used with success as a substitute for oak-bark, in tanning leather, and particularly in preparing a kind of morocco from sheep, calf, and goat-skins.

Lastly, Dambourney asserts, that, from the leaves of the last mentioned species, he produced a beautiful and permanent gold colour, in dying wool properly prepared by a solution of bismuth.

ANGER may be defined to be a vioa violent passion of the mind, arising from a sense of personal injury, and attended with an ardent desire of revenge.

It is either deliberative or instinctive; in the latter case, it is rash and precipitate, and blindly operates, regardless of the present, or of future consequences; in the former, it anticipates the moment of revenge, and meditates retaliation. It is not always, however, a selfish passion, since it is as frequently excited by injuries offered to others as to ourselves, and is often the distinguishing characteristic of a susceptible and vigorous mind.

Indulged to excess, and excited by every petty provocation, it becomes habitual, and is sometimes productive of the most fatal effects. Independent of its moral consequences, excessive anger produces spasmodic contractions, and stagnations in the liver and its vessels; and, by these means, renders them schirrous, often generating stones and gravel in the gall-bladder and biliary ducts. When accompanied with affliction, it usually occasions paleness of the countenance, palpitation of the heart, faltering of the tongue, trembling of the limbs, and jaundice. When the hope of revenge is the predominant feature in anger, it causes violent commotions of the whole system, strong pulsation of the arteries, and a quick circulation; the vital spirits flow rapidly and irregularly through the whole body; the muscles are contracted, and some of them appear almost palsied; the cheeks are flushed, the eyes sparkle with additional lustre, and the whole frame feels unusual animation, and a desire of motion.

Anger is particularly injurious to infants, who, from the sensibility of their frames, are extremely susceptible of this passion, and are sometimes so severely affected as to die suddenly in convulsions, or to retain, ever after, an imbecility of mind and body, arising from its powerful impression. Persons of an irritable habit are more frequently liable to its attacks; hence it generally appears in individuals who are troubled with nervous, hysterical, and hypochondriacal complaints. Those of a hot and dry temperament, of strong black hair, and great muscular strength, are likewise much exposed to its influence.

We ought, as rational agents, to beware of encouraging such destructive emotions; for it is certain, that men and women, possessing an irascible temper, generally die of pulmonary consumptions; and young persons, especially females, should be informed, that independently of its moral turpitude, it deforms the face, steals the rose from the cheek of beauty, and not only tends to extinguish the most tender affections, but sometimes even produces aversion.

On its first approach, persons subject to the invasion of this turbulent passion, should, as much as possible, divert their attention from the cause, by an application to some other object. A propensity to anger is increased by want of sleep, stimulant food, spices, wines, and such things as have a tendency to inflame the blood. Hence they ought to make use of diluent, acidulated, and gently aperient drink; and in every respect observe the most rigid temperance: they should allow themselves more sleep, employ the luke-warm bath, and indulge in the eating of fruit, butter-milk, whey, vegetable aliment, &c. —See GRIEF, PASSIONS, REVENGE, TERROR.

ANGLING, among sportsmen, is the art of fishing with a rod, to which are fitted a line, hook, and bait. The season for this amusement commences about the month of June, and the proper hours are, at the dawn of day, and about three o'clock in the afternoon; at which times the fish, in ponds and small rivers, are accustomed to feed. Easterly winds afford but little sport to the angler; for those blowing from the south, are the most conducive to his purpose; and a warm, but lowring day, is of all others the most propitious. A cloudy day following a bright moon-light night, is always an auspicious omen; as the fish do not love to seek for food in the moonshine, and are, therefore, always hungry the next morning. The observation of small fish, confined in a jar, either refusing or taking food, affords a good criterion of the most convenient season.

Upon taking his stand, the angler should shelter himself under some tree or bush, or remain at least so far from the brink of the water, that he may just discern his float; as the fish are timorous, and easily frightened away. The rod must be preserved in a moderate state, neither too dry nor too moist, as in these cases it will be either brittle or rotten. Various baits are used; such as worms, artificial flies, paste made of boiled cheese, beat up with powdered quick-lime, &c.; when these last are employed, it will be proper to cement them with a little tow, and rub them over with honey. The best method of using the fly, is down the current of the stream; and half a dozen trials will be sufficient to determine, whether the fish will take or refuse the bait.—With respect to the habitations most congenial to particular kinds of fish, it deserves to be noticed, that *bream* are to be found in the deepest and most quiet places; *eels*, under the banks of rivers; *perch* and *roach*, in a pure, swift stream; *chub*, in deep, shaded holes; and *trout*, in clear, rapid brooks. Situations abounding in weeds, or old stumps of trees, often harbour numbers of fish, which bite freely; but there is great hazard of breaking the line, or entangling the hook. The openings of sluices and mill-dams always invite them up the current, to seek for the food which is conveyed with the stream; and angling in these places is generally successful.—See FISHING.

ANIMAL, in natural history, signifies an organized, living body, capable of voluntary motion, and endowed with sensation.

The most powerful instinct of animals is, that of *self-preservation*, and the *propagation* of the species: in order to promote the purpose for which they are created, both nature and art afford various, and frequently singular expedients. In this place, however, we cannot enter into the particulars, which will be treated of under the different heads of APPETITE, NOURISHMENT, SLEEP, &c. The two last mentioned sources usually supply those powers which have been wasted by hunger and thirst, motion, perspiration, &c. We observe, on many occasions, the most admirable contrivances of the inferior creation, instinctively displayed; for instance, in the hexagonal cells of bees, and the architectural habitations of the beaver. Man, indeed, is the only animal which is possessed of no artificial instinct, or motives of actions performed by mechanical impulse; but, to compensate for this apparent deficiency, Providence has endowed him with reason, a faculty which elevates him far above all other created beings, and enables him to render himself master of the earth.

With respect to the division of animals into different classes, we refer to the article ANIMAL KINGDOM.

ANIMALCULE, in its general acceptation, merely signifies a little animal, but is usually applied to those living objects, which are invisible to the naked eye, and can be discoverable only by the assistance of glasses.

By the invention of the microscope, we have become acquainted with a variety of animals, which, from their minuteness, would otherwise have escaped our observation; and there is reason to believe that myriads of them exist, both in the atmosphere and on the earth, which elude the human eye, even when assisted by this instrument. They are of various kinds, and to be met with in different natural bodies. By the assistance of magnifying glasses, they may be seen in water, vinegar, beer, milk, &c.; they are also found in corn, paste, flour, and other farinaceous substances.

In the year 1677, M. LEWENHŒCK first discovered their existence in the human semen, and that of the lower animals; their number is inconceivable. On viewing with a microscope the milt or seed of a male cod-fish, he found them in such swarms, and of so diminutive a size, that he supposed 10,000 of them, at least, capable of being contained in the bulk of a grain of sand; whence he concludes, that the semen of this fish produces more animalculæ than there are found living persons in the whole world. They appear to be very vigorous and tenacious of life, as they continue to move long after the animal, from which they are taken, is dead. They also have this peculiarity, that they are in constant motion, without intermission, provided there be sufficient fluid, in which they may swim.

Great numbers of animalculæ, some of which are of an oval figure, and others resemble eels, are to be found in the whitish matter that adheres between the human teeth; but they have never hitherto been discovered, either in the blood, saliva, urine, bile, or chyle.

Animalculæ are generated by putrefaction, and are supposed to produce many diseases, such as the plague, typhus, marsh miasma, &c. The small-pox, measles, and other cutaneous eruptions, are also by many conjectured to owe their origin to this source.

The existence of animalculæ in the semen, has by several authors been denied, and among others by Mr. NEEDHAM, who, in an inquiry into the generation or production of animals, observes that seeds macerated in water, first disunite into small, motionless, and apparently inert particles, but that these afterwards possess power of motion, and seem alive, though in reality they are not so. He asserts, that there are no pre-existent germs formed for the production of animals, or vegetables, but that matter, organized in a peculiar manner, in its minute assemblages, produces them. In this opinion he is supported by M. BUFFON, REAUMUR, MAUPERTUIS, and other French Naturalists.—See GENERATION and MICROSCOPE.

ANIMAL FLOWER *(Actinia Sociata)* from its supposed property of stinging, was formerly called Sea-Nettle or Sea-Anemone, but by late English writers has received its present name. This singular animal was found in some of the islands which were ceded to this country in the late treaty of peace with France. It is of a tender, fleshy substance, which consists of many tubular bodies, gently swelling towards the upper part, and terminating like a bulb, or very small onion: its only orifice is in the centre of the uppermost part, surrounded with rows of tentacles or claws which, when contracted, appear like circles of beads. This opening is capable of great extension, and it is amazing to see what large fish some of them can swallow, such as muscles, crabs, &c. When the animal has scratched out the fish, it throws back the shells through the same passage. From this aperture likewise, it produces its young ones alive, already furnished with little claws, which they extend in search of food, as soon as they are fixed. At low water they are found on the rocky coasts of Sussex and Cornwall, attached in the shallows to some solid substance, by a broad base, like a sucker. This base is worthy of notice—the knobs observable on it, are formed into several parts, by its insinuating itself into the inequalities of rocks, or grasping pieces of shells, part of which frequently remain in it, covered with the fleshy substance. By its assistance, they are enabled to preserve themselves from the violence of the waves, and withstand the fury of a storm. Animal flowers very much resemble the exterior leaves of the anemone, and their limbs are not unlike its shag, or inner part. They are said to possess, in an extraordinary degree, the power of re-production, so that to multiply them at pleasure, nothing more is necessary than to cut a single one into several pieces.

ANIMAL FOOD. See FOOD.

ANIMAL KINGDOM, an expression which includes all organized living bodies capable of sensation and voluntary motion: and essentially differing from plants and minerals, which have neither organs of sense, nor the power of loco-motion.

Another circumstance affords a criterion to distinguish animals from vegetables and fossils; which, in many instances, so closely border on each other, especially the two former, that naturalists have frequently hesitated, to which of these kingdoms certain marine productions, for instance, the polypus, may with the greatest propriety be referred.—See VEGETABLE and MINERAL KINGDOMS. The circumstance alluded to is the following:

1. All bodies which grow *from without*, that is, derive their origin and increase in such manner as to approximate to themselves certain foreign and inert particles, and are incapable of motion, consequently inanimate, are called *minerals* or fossils.

2. Bodies having no aggregate form, but growing *from within*, being provided with certain tubes or vessels adapted to the circulation of fluids, which afford them nourishment and promote their extension may be said to enjoy a passive life, and are therefore termed *vegetables*, or plants.

3. Living creatures which likewise grow *from within*, and are endowed not only with those vessels, but also with organs of sense, the faculty of loco-motion, and the *power of distinguishing one external object from another*, yet do not enjoy the advantages of reason, are generally denominated *animals*.

Hence arise the three divisions of natural bodies, consisting of the ANIMAL, VEGETABLE, and MINERAL KINGDOMS.

Although naturalists, in general, have included *man* in the first of these kingdoms, yet the propriety of this classification may justly be doubted. He possesses, indeed, organs and faculties in common with the brute creation, yet no instance has been discovered, which evinces that the inferior animals enjoy that noble and most important of all the gifts of Providence, '*reason*.'

On account of this distinguishing characteristic, we are irresistibly induced to separate man from the ape, the elephant, the lion, and all irrational animals, over which no other than the reasoning faculty could confer upon us the exclusive dominion. Trusting, therefore, that naturalists will, without hesitation, agree with us in the necessity of rescuing the human race, however at present depraved, from the humiliating situation in which it is placed among the inferior animals, we venture, with due deference to their judgment, to exclude our species from the subsequent division of the animal kingdom, which consists of six distinct classes.

I. *Mamillary Animals* are furnished with a heart of two ventricles and two auricles; have a red, warm blood, breathe through lungs, produce living young ones, and suckle them with their milk.

II. *Birds* likewise have a heart of four cavities, red, warm blood, respire through lungs, deposit eggs, and are uniformly provided with beaks and wings.

III. *Amphibious Animals* possess a heart, but it has only one ventricle and one auricle; they have red, but colder blood than the latter, and live alternately on land and in water.

IV. *Fishes* have also a heart with two cavities, red, cold blood, are provided with gills, and can subsist only in water.

V. *Insects*, or creatures, that have a heart with one ventricle, but no auricle; cold, and generally white blood; are furnished with *antennæ*, or feelers, on their heads, and undergo a change of their nature and appearance, previous to their dissolution.

VI. *Worms* also have a heart with one ventricle, without an auricle; cold, white blood; are provided with *tentacula*, or feeling threads, but undergo no change.

Conformably to this division, we shall give a more or less detailed account of the different domestic and wild animals, which either from their peculiar nature, habits, and form, deserve to be noticed in this work, consistently with its original plan; or which, in an economical view, contribute to relieve our necessities: while a more accurate knowledge of useful creatures cannot fail to improve the mind, and gratify the laudable curiosity of an intelligent reader.

ANIMAL LIFE is that organized principle which distinguishes animals from vegetables, and is susceptible of sensation and reflection.

Various conjectures have, at different periods, and by eminent philosophers, been held respecting the nature and origin of this important principle, but it still remains involved in obscurity. In a late Dissertation, addressed to the President and Fellows of the College of Physicians, Dr. BEATTIE resolves it into that inherent tendency to approximation and cohesion, in some parts of matter, and that resilition and elasticity in others, the source of which is yet undiscovered, and which is not deducible from any material, secondary cause. As it was found that no animal could exist when suddenly deprived of large quantities of blood, it was inferred that this fluid was the vital principle; an opinion, indeed, which was much strengthened by the injunction of the Mosaic Law, not to eat meat in which there was blood, "that being the life." A late celebrated anatomist adopted this opinion, and boldly declared that the blood was alive. By some physiologists it has been conjectured, that the *electric fluid* is the source and principle of animal life: on the contrary, modern chemists maintain that it is conveyed by that elastic elementary gas, termed *oxygen*, or vital air, which, according to their notions, is the true principle of vitality.

Without entering into a minute investigation of these theories, it will be sufficient to state a few of the leading circumstances which accompany the progress towards animation.

Heat is a material agent in the production and continuation of life, as is beautifully illustrated in the incubation, or hatching of an egg; the progress of which towards maturity, is nearly as follows:—On the first day, no perceptible alteration takes place; on the second, the treadle changes to a pale yellow colour; and every following day it becomes yellower, till at length it grows red, and afterwards of a deep blood-colour, which soon thickens to a firmer substance; this speedily assumes a form, which, when it thickens into life, is nourished by the yolk, and laid in the white as in a bed provided for its accommodation; thus it continues increasing, till it grows too large for its narrow bounds, when it bursts the wall of its prison, and comes forth a perfect animal.

ANIMAL MAGNETISM, or the art of curing diseases by the magnet, was invented by a German philosopher, named Father HEHL, of Vienna, who first applied it to medicine: but the noted MESMER, a physician of the same city, by adopting his principles, and afterwards carrying them to a greater extent, has been generally considered the author of this splendid, but fanciful system. The principles of that delusive art, are described by him in the following manner:—Animal magnetism is an universal fluid, constituting an absolute *plenum* in nature, and the medium of all mutual influence, between terrestrial, animal, and celestial bodies. It is a most subtle fluid, capable of flux and reflux, and of receiving, propagating, and continuing all kinds of motion. The human body has poles, and other properties, analogous to the magnet, and is subjected to its influence, by means of the nerves. The action and virtue of animal magnetism may be transferred from one body to another, whether animate or inanimate. It operates at a great distance, without the intervention of any substance; is increased and reflected by mirrors; communicated, propagated, and augmented by sound; and may be accumulated, concentrated, and transported. By means of this fluid, some nervous disorders are cured immediately, and others mediately: its virtues, in short, extend to the universal benefit and preservation of mankind.

From this extraordinary theory, MESMER fabricated a paper, in which he asserted that all diseases arise from one common source; that they may be removed by one mode of cure; and that this cure consists in the application of animal magnetism. The folly and credulity of the times soon gained partizans to this new and plausible theory: it became at length so popular and fashionable in France, that the jealousy of the faculty was awakened, and an application was made to government. A committee, consisting of physicians and members of the Royal Academy of Sciences, of which the late illustrious FRANKLIN was a principal member, was immediately appointed, to inquire into its merits, and to ascertain its effects. The consequence of this examination was such as might have been anticipated by every rational mind. The spell was quickly broken, and the whole disclosed to be an artful imposition on the weakness and credulity of mankind. It is now almost universally exploded, and treated with merited ridicule and contempt. The practice, however, and subsequent detection of this wild, and visionary doctrine, have not been altogether useless; since to the philosopher, it has added one more to the numerous catalogue of the errors and illusions of the human understanding; and affords a memorable instance of the power of imagination.—See ELECTRICITY and MAGNETISM.

ANIMAL MOTION: various conjectures have been broached with a view to account for the origin of this important function in the animal economy: but, like most other springs of action, arising from *a first cause*, it is only in a slight degree cognizable to our senses, by its evident, mechanical effects.

Anatomists have, indeed, in their dissections demonstrated, that the contraction of the muscles causes motion, but by what peculiar process, or how produced, remains still doubtful, and involved in obscurity. Among other hypotheses advanced concerning animal motion, there prevails an opinion that it is occasioned by an impulse or irritation of the nerves; which, communicating with all parts of the body, produce muscular contraction, and consequent motion, either to a part or to the whole of the frame, in proportion to the force or frequency of the impression. The difficulty of comprehending, how mere impulse, or irritability of the nervous system, should alone be sufficient to produce such powerful effects, as often follow muscular contraction, has induced others, while they admitted this principle as a *first* cause of animal motion, to believe in the intervention of some other matter, which is the more immediate agent, in effecting a closer contact of the muscular fibres, and greater energy during the time of their contraction.

The existence of such a subtle matter, as may be capable of performing these wonderful phenomena,

mena, has been considered as highly probable; and is supposed to reside in the medullary substance of the nerves. This opinion has, lately, been in a great measure corroborated by the discovery of valves of various sizes attached to the nerves, which valves are found in greater or smaller numbers, accordingly as the animal is either of a quicker or slower motion.—See MUSCLES.

ANIMAL ECONOMY, in its more extensive sense, implies an accurate and physiological knowledge, of the use, structure, and component parts of all animal bodies; but is here intended, to signify only such a view of the human system, as may afford the means of preserving health, and promoting the useful purposes of life.

The enjoyment of "a sound mind" in a healthy body, being the greatest of earthly blessings, a portion of the time and industry of every rational being ought to be employed in the acquisition of so desirable a state. For this purpose, nothing is more essential than a proper knowledge of the various branches of animal economy, by the assistance of which we are not only enabled to preserve ourselves in perfect health, but to remove, and frequently to obviate the attack of many disorders to which we are liable, and which, from our ignorance and mismanagement, might otherwise be productive of the most fatal consequences.

Animal economy, therefore, ought certainly to form part of a liberal education. It is not, however, necessary, nor is it convenient, that all persons should be minutely instructed in the more abstract and difficult branches of medical or anatomical science; but an acquaintance with such familiar and practical parts as are of general use and application, should never be superseded by other less serviceable pursuits.

Hence we have been induced to explain and analyze, in this work, many subjects, though apparently remote from its original design, yet so intimately connected with the physical prosperity of the individual, that an omission of such articles would be irreconcilable to our chief aim—that of exploding hurtful prejudices, and communicating useful information. Of this nature and tendency, are the articles, ABDOMEN, ABORTION, ABSCESSES, AIR, AMPUTATION, ANEURISM, and many others in the sequel of this Encyclopædia.

ANIMAL SPIRITS are supposed to consist of a fine and subtle fluid, secreted in the cortical substance of the brain, and spinal marrow, which passes through the medullary part, and is conveyed through the cavities of the nerves to every point of the body. In support of this ingenious and probable conjecture, many argumenss have been adduced: Dr. MEAD, in his *Essay on Poisons*, contends that the existence of animal spirits is proved by the almost instantaneous diffusion of poisonous venom through the whole body; for the bite of a rattle-snake killed a dog in less than a quarter of a minute, in which time, according to Dr. KEIL's computation of the velocity of the blood, the brain or heart could not have been injured by its circulation: the cause of its death must, therefore, be ascribed to a quicker medium, which can be no other than that of the animal spirits.

ANIMATION, is that property

which distinguishes living from dead or inanimate matter, and is frequently used to denote the principle of life itself. Strictly speaking, however, it is that which imparts energy and activity to the vital powers; as these may still continue, when animation is either suspended or destroyed. It is capable of modification, and varies in its proportion at particular times, and in different persons.

In a moral or intellectual sense, it denotes an elevated state of the mind, in consequence of the predominance of some powerful passion, such as love, anger, ambition, &c. or the vigorous application of stimuli, such as wine, spirits, air, exercise, &c.

Of those causes which produce it in the highest degree, the chief and most essential is *air*;—given either in its purest state, or in certain combinations with other gases, its effects are so singular, as to resemble those which were formerly said to be produced by magic. Mr. HUMPHRY DAVY, of Clifton, in a work lately published, informs us, that after inhaling nitrous oxyd, a gas hitherto considered as irrespirable, several persons, as well as himself, generally exhibited symptoms of the highest animation. A chearful serenity and apparent exultation of mind; a degree of expansion, as if the whole body with all its vessels were extended; a powerful impulse to muscular action; and an indescribable transport, together with an irresistible inclination to laugh, were among the effects which it seldom failed to produce.

Animation may be either diminished, or suspended, without injuring or destroying the living principle. The former effect may be seen in those persons who have suffered from long and close confinement in prisons, hospitals, crowded and heated assemblies, as well as in fevers, consumptions, and other chronic complaints. In these cases, a proper and moderate application of the necessary stimuli, such as air, exercise, a nourishing diet, &c. will generally accomplish, either its partial or complete restoration. Of the latter, various instances have lately happened: persons who were accidentally suffocated or drowned, have, by timely and proper means (particularly those recommended by that excellent institution, the Royal Humane Society), been successfully re-animated, when life itself seemed on the eve of departing.

Among those causes which principally tend to preserve and increase animation, are temperance, gentle exercise, nourishing diet, wine, moderate gratifications, and constant activity, both corporeal and mental.

Various methods have, at different times, been recommended to restore animation when suspended, either from suffocation or drowning. In Spain, they first lay the body with its head downwards, near a fire, till it begins to feel warm, and eject water from the *trachea*, or windpipe; they then foment the whole breast, and seat of the heart, with spirits of wine, brandy, or bread dipped in strong wines. By these means, if the vital principle be not extinct, the circulation of the blood is usually restored.—The French Academy advise tobacco-smoke to be forcibly injected into the anus and lungs, after which a vein to be opened in the arm and foot: it is asserted that, by this method, persons who had lain many hours under water, have been happily resuscitated.

In the *Journal Historique sur les matieres du tems*, for Dec. 1758, a case is related by Dr. Du Moulin, who succeeded in recovering a young woman after she had lain for several hours under water. All pulsation having ceased, he considered it as a desperate case, and was induced to try a method he had frequently observed to be successful with flies and other insects, which, when drowned or apparently dead, had been revived by half burying them in ashes or salt. He accordingly ordered a quantity of dry pot-ashes to be strewed, about three inches deep, on a bed: upon this layer his patient was placed, and another, about two inches in depth, was spread over her. The head was covered with a cap containing some of these ashes; and a stocking filled with the same material, was placed round her throat. Blankets were then laid on the bed; and in half an hour her pulse began to beat; after which she quickly recovered. If pot-ash cannot be readily procured, dry salt may be used as a substitute.

In Russia, the common people are frequently deprived of sensation, by pestilential vapours arising from the following cause. Persons of rank, in that country, have double windows to their houses in winter, but those of the poorer classes are only single. During frosty weather, an incrustation is formed on the inside of those windows, from a condensation of the breath, perspiration, &c. of a number of persons living together in the same room. This mephitic crust is mixed with the noxious fumes of candles, and of the oven with which the chamber is heated. When a thaw succeeds, and this plate of ice is converted into water, a deleterious principle is disengaged, which produces effects similar to those arising from the fumes of charcoal. The method of recovering persons affected by this effluvia, is as follows: they are immediately carried out of doors, and placed on the snow, with no other covering but a shirt and linen drawers. Their temples, and the region of the stomach are then well rubbed with snow; and cold water and milk is poured down their throats. The friction is continued till the livid hue of the skin disappears, and the surface acquires its natural colour.

In cases of apparent death, from drowning, it is necessary to rub the breast and temples for a considerable time with salt, and all the other parts with warm cloths. Bladders filled with warm water, or bricks heated and wrapped in flannel, should be applied to the soles of the feet, under the arm-pits, and between the thighs. The head should be covered with blankets, to preserve the lungs from too sudden an ingress of the air, on the renewal of respiration. When symptoms of returning animation appear, a few ounces of blood may be taken from the arm.

Farther directions for the management of bodies in that unfortunate situation, we propose to communicate under the articles of Drowning, Suspension by the cord, Lightning, &c.

As a proof the success which has attended the exertions of medical men in this country, who have liberally co-operated with the benevolent design of the Royal Humane Society, under the immediate patronage of our august Sovereign, we shall adjourn this subject, in the words of our worthy friend, the philanthropic Dr. **Hawes**, a gentleman whose integrity and disinterested activity deserve equal commendation: "Animation (says this noble veteran), has been given to THOUSANDS since 1774, *the birth* of our life-saving labours."

ANISE, or *Pimpinella*, in botany, is an annual, umbelliferous and aromatic plant, of which there are ten species, though scarcely three of them are indigenous, namely:

1. The Common Burnet Saxifrage, or the *Pimpinella Saxifraga*, L. which grows on a dry, calcareous, gravelly soil, blossoms in July and August; and is described in Dr. Withering's *Arrangement of British Plants*, p. 311, and *Engl. Bot.* T. 407.

Every part of this useful plant has a fragrant smell and taste, and is subservient to many beneficial purposes.

The white root of the burnet-saxifrage is of a very hot, pungent, bitterish taste, which may be entirely extracted in rectified spirits of wine, and affords a medicine of great efficacy in scorbutic and cutaneous disorders in general, but especially for dropsical and asthmatic complaints, in which it has been administered by the great Boerhaave, with singular success. Although he directs it to be taken only in a watery infusion, yet we would prefer the tincture, as possessing in a superior degree the medicinal virtues of the root. In short, the physicians of Germany frequently prescribe it in cases where emollient, resolvent, detergent, diuretic, and stomachic remedies are indicated, as well as for removing tumors and obstructions in the glands.

Frederic Hoffman asserts, that this vegetable is an excellent medicine for promoting the menses; while other writers recommend it in all cases where pituitous humours are supposed to prevail, such as catarrhal coughs, hoarseness, and humid asthma, but particularly in a symptomatic sore throat, called the mucous quinsy.

There is a variety of the burnet-saxifrage growing wild in Brandenburgh, and denominated by Elsholz, a Prussian botanist, the *Pimpinella cœrulea*, or the blue pimpinella; as it differs from the former only, by yielding a blue colour in rectified spirit, a similar oil on distillation, and a fine blue juice on expressing the fresh root. For this reason, we have mentioned it, as it may probably afford a proper substitute for *indigo*, which we are obliged to import at a considerable expence.

The young leaves and shoots of this species are very palatable, and are eaten as salad: small bunches of them tied together, and suspended in a cask of table-beer, or ale, impart to it an agreeable aromatic taste; and, it is affirmed, that they likewise tend to correct tart and spoiled wines, which, by this simple expedient, may be restored to their former briskness.

As the herbs of this plant are acknowledged to be a very wholesome fodder for cows, to increase their milk, and to preserve them against epidemics, we presume to recommend its culture to the farmer and grazier.

2. The Great Burnet-Saxifrage, or the *Pimpinella magna*, L. delights

lights in shady places, on a calcareous soil, also flowers in July and August; and is described by WITHERING, p. 313, and *Engl. Bot.* T. 408.

It is stated to possess properties similar to the former, though cattle refuse to browse upon it, on account of its hard stalks, which often attain the height of four feet.

3. The Dwarf Burnet-Saxifrage, or *Pimpinella dioica*, L. is rather a rare plant in this country; it only grows on hilly pastures and calcareous soils, for instance, on St. Vincent's Rock, near Bristol, and above Uphill, in Somersetshire.

It bears flowers in May and June; is described by WITHERING, p. 313; and delineated in GERARD's *Herbal*, 1054. 3.

Its properties are not sufficiently ascertained; but being a dwarfish plant, the two preceding species in every respect deserve the preference.

ANNEALING, by artificers called *nealing*, is a part of the process of making, or finishing, glass; and consists in placing bottles and other vessels, while hot, in a kind of oven or furnace, where they are suffered gradually to cool.

The difference between unannealed, and annealed glass, is very remarkable. When a glass vessel that has not undergone this process, is broken, it often flies into a small powder, with a violence apparently disproportionate to the stroke which it received. In general, it is in greater danger of being broken from a very slight blow, than from a more considerable one. Such vessel will often resist the effects of a pistol bullet dropt into it from the height of two or three feet, yet a grain of sand falling into it, will break it into small fragments. This sometimes takes place immediately on dropping the sand into it, but the vessel will frequently remain apparently sound, for several minutes after; when, without the least touch, it will suddenly fly to pieces. If the glass be very thin, this effect does not take place; and, on the contrary, it seems to possess all the properties of such as are annealed.

Glass is one of those bodies which increase in bulk, on passing from a fluid to a solid state. When it is allowed to crystallize regularly, the particles are so arranged, that it has a fibrous texture; but, when a mass of melted glass is suddenly exposed to a cold temperature, the surface crystallizes, and forms a firm shell round the interior fluid parts, by which they become solid, and are prevented from expanding.

By the process of annealing, the glass is preserved for some time in a state approaching to fluidity; the heat increases the bulk of the crystallized part, and renders it so soft, that the internal fibres have an opportunity of expanding and forming a regular crystallization.

A similar process is now used for rendering kettles, and other vessels of cast iron, less brittle; which admits of the same explanation as that above stated. The greater number of metals diminish in bulk when they pass from a fluid to a solid state. Iron, on the contrary, expands.

ANNUITY implies a sum of mony payable yearly, half-yearly, or quarterly, to continue for a certain number of years, for life, or for ever.

An annuity is called an arrear, when it continues unpaid after it becomes due; and is said to be in reversion, when the purchaser, upon paying the price, does not immediately enter upon possession: the annuity not commencing till some time after.

The interest upon annuities may be computed either in the simple or compound manner. But the latter, being most equitable, is generally preferred.

In the first class, viz. in those which extend for a limited period, the principal considerations are, the annuity, rate, and time being given, to find the amount, or sum of yearly payments, and interest. These are readily ascertained, by a series of algebraical calculations.

In freehold estates, the principal circumstances to be attended to, are,

1. The annuity, or yearly rent.
2. The price, or present value; and,
3. The rate of interest.

The value of life-annuities is determined by comparative observations and calculations derived from the bills of mortality. Several computations have been made for this purpose; the most esteemed of which are those by Dr. HALLEY, Mr. SIMPSON, and M. DE MOIVRE.

Breslaw, the capital of Silesia, being a central place, and not much crowded, was fixed upon by Dr. HALLEY, who had recourse to the bills of mortality, when he composed his table. He selected 1000 persons, all born in one year, and observed, how many of these remained alive every year from their birth, to the extinction of the last; and, consequently, ascertained the number which died in each year, as follows:

Age.	Persons living.	Age.	Persons living.	Age.	Persons living.	Age.	Persons living.
1	1000	24	573	47	377	70	142
2	855	25	567	48	367	71	131
3	798	26	560	49	357	72	120
4	760	27	553	50	346	73	109
5	732	28	546	51	335	74	98
6	710	29	539	52	324	75	88
7	692	30	531	53	313	76	78
8	680	31	523	54	302	77	68
9	670	32	515	55	292	78	58
10	661	33	507	56	282	79	49
11	653	34	499	57	272	80	41
12	646	35	490	58	262	81	34
13	640	36	481	59	252	82	28
14	634	37	472	60	242	83	23
15	628	38	463	61	232	84	20
16	622	39	454	62	222	85	15
17	616	40	445	63	212	86	11
18	610	41	436	64	202	87	6
19	604	42	427	65	192	88	5
20	598	43	417	66	182	89	3
21	592	44	407	67	172	90	1
22	586	45	397	68	162	91	0
[illegible]	579	46	387	69	152		

As there is allowed to be a greater disparity between births and burials in the city of London, than in any other place, Mr. SIMPSON selects 1280 persons, all born in the same year, and records the number remaining alive each year, till none be left, in order to form a table particularly suited to this populous city.

The following is Mr. SIMPSON's table on the bills of mortality, at London:

Age.	Persons living.	Age.	Persons living.	Age.	Persons living.	Age.	Persons living.
0	1280	24	434	48	220	72	59
1	870	25	426	49	212	73	54
2	700	26	418	50	204	74	49
3	635	27	410	51	196	75	45
4	600	28	402	52	188	76	41
5	580	29	394	53	180	77	38
6	564	30	385	54	172	78	35
7	551	31	376	55	165	79	32
8	541	32	367	56	158	80	29
9	532	33	358	57	151	81	26
10	524	34	349	58	144	82	23
11	517	35	340	59	137	83	20
12	510	36	331	60	130	84	17
13	504	37	322	61	123	85	14
14	498	38	313	62	117	86	12
15	492	39	304	63	111	87	10
16	486	40	294	64	105	88	8
17	480	41	284	65	99	89	6
18	474	42	274	66	93	90	5
19	468	43	264	67	87	91	4
20	462	44	255	68	81	92	3
21	455	45	246	69	75	93	2
22	448	46	237	70	69	94	1
23	441	47	228	71	64	95	0

But these tables, however perfect they may be in themselves, must be considered only as probable conjectures, founded on the usual period of human life, which is estimated as follows:

1. The probability that a person of a given age may live a certain number of years, is measured by the proportion which the number of persons living at the proposed age bears to the difference between the said number, and that of persons existing at the given ages.

Thus, if it be required to know what chance a person 40 years of age may have to live seven years longer, the reader should refer to Dr. HALLEY's table, and from 445, the number of persons living at 40 years of age, subtract the number of persons living at 47 years of age, and the remainder, being 68, will be the number of those who have died during those seven years. The probability, that the person in question will live these seven years, is in the proportion of 377 to 68, or nearly as $5\frac{1}{2}$ to 1. By Mr. SIMPSON's table, the chance is somewhat less than that of 4 to 1.

If it be desirable to ascertain the year, which a person of a given age has an equal chance of attaining, the inquirer ought to find half the number of persons living at that given age, in the tables; and the year required will appear in the column of ages.

The premium of insurance upon lives may also, in some degree, be regulated by these tables, as follows:

The chance which a person of 25 years has to live another year, is, by Dr. HALLEY's table, as 80 to 1; but the chance that a person of 50 years has to live a year longer, is only 30 to 1; and consequently the premium for insuring the former ought to be the premium for insuring the latter for one year, as 30 to 80, or as 3 to 8.

Life-annuities are commonly bought or sold at a certain number of years' purchase. The value of an annuity of one pound for an age of 50 years, at 3 per cent. interest, is about 12l. 10s. or twelve and a half years' purchase.

Among those who have written on this subject, none is more deservedly celebrated than Dr. PRICE, the author of *Observations on Reversionary Payments, Annuities*, &c. published in 1771; and his curious remarks on this subject, inserted in the lxv^th^ vol. of the *Philos. Transactions*, for 1775, p. 424, are well worthy of perusal and attention.

In our opinion, life-annuities, when granted by individuals whose property is already involved, or who by such an expedient injure the just expectations of their relatives, ought not to be connived at in a well-regulated State.—Viewed in a commercial light, this species of gambling, in a certain degree, resembles the furious rage for the hazard or pharo-table; to which all those adventurers and avaricious money-lenders generally resort, who are anxious to amass large sums of money, which, by moderate legal interest, could not be realized.

ANODYNE, is a term applied to medicines which have a tendency to assuage pain. This desirable purpose may be attained in three different ways: 1. By *paregorics*, or such remedies as are calculated to ease pain; 2. By *soporifics*, which relieve the patient by causing artificial sleep; and 3. By *narcotics*, or such as stupify, by their action on the nervous system.

This division, though sanctioned by general authority, is very imperfect; and we shall attempt to explain the subject in a manner, perhaps, more consonant with just principles of animal economy—not from the result, but from the cause by which a proper application of anodynes induces certain changes in the human body. In order to give a distinct view of the subject, we shall arrange them under three classes; namely,

I. Such remedies as tend either to remove the offending cause, or prevent the part affected from receiving a sensible and painful impression, viz. in consequence of the amputation of a limb; the drawing of a tooth; the burning of parts either by the cautery, or by means of a red-hot iron; the application of the tourniquet, a tight ligature, compresses, &c. To this class also belong opiates, and other stupifying medicines, administered for the suspension of pain; but which may be justly termed, "poisons of the sensitive faculty." However liberally others may explain the effects of opium on the organs of the mind, we cannot avoid observing, that its operation on the *sensorium commune* is always attended with violence, and that so powerful a medicine ought not to be intrusted to the hands of those who are but little acquainted with its nature. Nay, we are of opinion, that even medical men cannot be too careful in its exhibition; but far from wishing to deprecate the use of this invaluable drug, which cannot, in the present state of medical science, be excluded from the list of *medicinal* substances, we shall here venture to suggest a few ideas respecting the propriety, and greater safety, of its external use.

In very painful wounds, excruciating rheumatism, contractions, and paralytic affections arising from frequent spasms and strictures, the *external* use of opium is both safe and beneficial, especially if combined with antispasmodic and emollient remedies, such as camphor, lint-seed oil, marshmallows, &c. These *alone* are frequently sufficient to relieve distressing pain, without the assistance of anodynes properly so called; as the latter generally determine the circulation of blood towards the head, and occasion giddiness, stupor, and a relaxation of the nerves. With the above additions, however, opium may be advantageously employed in the form of baths, fomentations, ointments, cataplasms, and particularly in *clysters.*—(See the article Abdomen, p. 5. *laudanum).*

When the pain is in the interior organs, and its seat cannot be precisely ascertained, or when it arises from causes which neither the patient nor physician can discover, we would prefer the following *anodyne liniment*, a timely application of which has frequently procured immediate relief: take one ounce of the dried leaves of the common henbane, or four ounces of the green plant, and half a pint of sweet olive oil; digest them near a fire for a few days, then express the leaves through a coarse piece of linen, filter the decoction, and preserve it in a vessel closely stopped. This preparation, if applied warm, or rubbed into painful parts, has, according to our own experience, proved of singular efficacy.

II. Those remedies which are calculated to change, suppress, or evacuate the *material* cause of pain, and are therefore the most rational, though, unfortunately, not always within the reach of the medical practitioner. Thus, if the intestinal canal be obstructed, or the stomach clogged with acrid matter that cannot fail to produce violent colics, and other disorders, the principal aim will be to evacuate it by purgatives, or emetics, and thereby not only cure the complaint, but, at the same time, save the patient's life, which, by means of opiates, given either by the mouth or clyster, without such previous evacuations, would be exposed to imminent danger. Hence we are induced to express our opinion decidedly in favour of those who, from a conviction of the great importance of the trust reposed in them, seriously hesitate to employ anodynes, so long as there is a possibility of dispensing with such precarious remedies. But, in cases where the morbid matter cannot be expelled, a skilful practitioner will endeavour, at least, to deprive it of its activity, or to neutralize it, while in the human body. In this manner, pains arising from acrimonious humours are relieved by drinking bland, diluent, and saccharine liquors; from intestinal worms (though resisting every vemifuge), by remedies which destroy them before they are carried off by the feces; from a pleurisy, by such means as resolve the stagnant fluids, and promote their circulation through the constricted capillary vessels; from stones in the bladder, if they be too large for expulsion, by the use of lime-water, which tends to blunt their edges,&c. These illustrations, however, might be accompanied with a variety of practical hints and precautions, if we did not intend to reserve such observations, till we have occasion to treat of the different acute and painful diseases, under their resspective heads.

III. The last class of anodynes comprehends all those which, by exciting impressions and representations of a different kind, either counteract or subdue the pain. These are generally resorted to, when neither the affected organs can be locally relieved, the material cause removed, nor the senses stupified by narcotics. Hence physicians are frequently obliged to employ such expedients as may suppress the partial affection, by exciting feelings of a different nature, and perhaps to a more intense degree than those occasioned by the original complaint. These remedies, however, require equal ingenuity and precaution. Thus, for instance, violent head-ach, tooth-ach, pains of the breast, &c. may be alleviated by blisters, or cataplasms made of onions, garlic, mustard-seed with vinegar, horse-radish, and similar stimulants; rheumatic and gouty affections, by early friction with flannel, which, for many reasons, is preferable to a flesh-brush. All these applications, nevertheless, ought to be maturely considered, previous to their use, with respect to the place, strength, and duration, of the stimulus.

To this class may also be referred, diversions of the mind; inclinations and passions artificially excited, in order to direct the attention of the patient to a different object: such expedients are frequently of excellent service, especially in chronic diseases, and to inveterate hypochondriacs. In a similar manner, terror and anger sometimes instantaneously suppress the painful sensations of gouty and rheumatic patients. Thus, the pleasures of conversation, a country-life, theatres, music, dancing, hunting, and similar amusements, are often more effectual anodynes than wine, brandy, or laudanum; the former agreeably cozen and delude the mind; the latter always, sooner or later, aggravate the complaint.

Having given this concise view of the subject, we shall add only a few general observations relative to the *manner* of determining, whether, and when a patient may with safety resort to anodynes; because, in this place, we cannot enter into particulars, which it would become necessary to repeat, when treating of those substances themselves.

If a person be suddenly seized with violent pains, the cause or source of which cannot be clearly ascertained, it will be of the first consequence to inquire, whether the patient be at the same time subject to febrile heat, accompanied by an unusual determination of blood towards the head, and a strong, full pulse. In such case, if the pain should not abate on the friction of the parts affected, or on plunging the legs in warm water, it would be proper to take a few ounces of blood from the arm or foot. In many instances of acute pain, however, the pulse is considerably depressed, and the circulation of the fluids in general so languid, that the extremities appear rather pale and cold: yet, under these circumstances also, it may frequently become necessary to bleed the patient without delay, in order to restore an uniform action of the vessels; a point to be determined by the judicious practitioner.

From whatever cause an internal or deep-seated pain may arise, it will always be useful to allow the patient considerable portions of diluent drink, such as luke-warm water mixed with a fourth part of milk, or decoctions of barley, blanched oats, rice, &c.; to administer emollient clysters, consisting of six parts of warm water, two of oil, and one of soft sugar; to wrap the suffering part in soft flannel, or, if it can bear the application of heat, to cover the whole with a common poultice, made of the crumb of bread boiled in milk, with the addition of a little sweet oil; to place the patient, if his peculiar situation and circumstances admit of this practice, in a tepid bath, of a temperature not exceeding 98° of FAHRENHEIT; and, lastly, if none of these expedients should afford the desired relief, to resort to opium, or laudanum, as the *last resource:* one grain of the former, or twenty drops of the latter, with a proper quantity of diluent beverage, is generally a sufficient dose, to persons not accustomed to its use. But let us here observe, that even in very desperate paroxysms of pain, there is no necessity of giving an indiscriminate preference to opium, till every other method has been previously tried: thus, for instance, the most excruciating head and tooth-ach have often been suddenly dispelled, by applying horse-radish in fresh shavings, or bruised garlick, between two fine pieces of muslin, to the bend of both arms, or the hams.

Another simple remedy of equal efficacy, in periodical head-achs, especially in the morning, is a thin piece of fresh lemon-peel freed from the soft fibrous part, and placed on each of the temples, before the volatile oil be evaporated. These external applications are perfectly safe; for, as their action is confined to the part which they stimulate, they occasion a degree of irritation different from the original complaint, and thus produce a cessation of pain. In the last-mentioned case, we would also recommend the *timely* application of a few leeches, either to the temples, or rather to the lateral part of the neck, behind the ears, where the effect is almost instantaneous.

Lastly, opium may be called an almost divine remedy, when judiciously administered, in gangrenes, after painful amputations, fractures of bones, and, in short, every operation attended with spasms and great prostration of strength; but especially in diseases of the eyes, such as the cataract, or gutta serena.

ANT, or *Formica,* in zoology, is a genus of insects belonging to the sixth class of the animal kingdom. The characters of this insect are, that there is a small scale between the breast and belly; and the joint is so deep, that the animal appears as if it were almost cut through the body. The females and the neuters, or working ants, which have no sexual characteristics, are furnished with a secret sting; and both the males and females have wings, but the neuters have none. There are eighteen species, which are in general distinguished by their colours.

These insects cohabit in numerous parties, and maintain a sort of republic, not unlike that of the bees. Their nests are in the form of an oblong square, and contain paths which lead to different magazines. Their method of constructing these habitations is truly wonderful. Some of the ants are employed in making the ground firm, by mixing it with a kind of glue, to prevent its crumbling, and falling upon them: others may be seen gathering several twigs, which they use for rafters, by placing them over the paths to support the covering: they lay others across, and upon these, rushes, weeds, and dried grass, which they form into a double declivity, and thus conduct the water from their magazine.

For provisions they secure every thing which, to them, is eatable, and we may often observe one loaded with a dead fly, sometimes several together with the carcass of a may-bug, or other large insect; and, if they cannot transport it, they consume part of it upon the spot, at least so much as may reduce it to a bulk adequate to their strength. They lay up hoards of wheat and other corn; and, for fear it should sprout from the moisture of their subterraneous cells, they gnaw off the end which would produce the blade. It is remarkable, that if one ant meets another which is loaded, it always gives way, or will help it, if it be over-burthened. Indeed, the strength of this little animal is astonishing, as one of them will frequently drag a burthen many times heavier than itself!

On depriving a mouse or other small animal of its skin, and placing it on an ant hill, in a little box, perforated in several parts, so as to admit a free passage for the ants, it will be found, in a few days, converted into the most perfect skeleton.

The ant deposits her eggs in the manner of the common flies, and from these eggs are hatched the *larvæ*, a sort of small maggots, or worms without legs; which, after a short time, change into large white *aurelia*, or chrysalids, usually called ant's eggs.

Although ants are considered as injurious to husbandry, by making their hills, and impairing the grass upon pasture land, yet they are unjustly reproached with damaging fruit-trees. In Switzerland, they are made subservient to the destruction of caterpillars, by hanging a pouch filled with ants upon a tree, whence they are suffered to make their escape, through an aperture, and over-run all its branches, without being able to reach the ground, as the trunk has been previously smeared with wet clay, or soft pitch, in consequence of which, impelled by hunger, they fall upon the caterpillars, and devour them.

Ants have also been successfully used in medicine. By distillation, they afford an acid liquor, which, when mixed with brandy, is by many considered as a strengthening nervous cordial; they have also been added to warm baths, when used for the gout and sprained limbs.

We shall now proceed to state several methods of destroying this numerous insect. The most simple of these is, to pour boiling water into the apertures of their hillocks. By mixing soot with cold water, and pouring it at the roots of trees infested by them, they will speedily be destroyed. Besides that already mentioned, there is another simple expedient, to prevent them from descending a tree which they visit. Nothing farther is required, than to mark with a piece of common chalk a circle round its trunk, about two feet from the ground, and about an inch or two in breadth: as soon as the ants arrive at this ring, not one will attempt to cross it. This curious experiment, however, should be performed in dry weather, and the ring must be renewed, when partly washed off by rain.

The small garden-ants, which are supposed to devour the young shoots of fruit-trees, may be destroyed, by placing among them a number of large ants, which are commonly found in the woods; as there prevails between these two species of insects so strong an antipathy, that the larger sort attack the smaller, and never relinquish the combat till they have extirpated, or driven their antagonists from the neighbourhood.

Mr. Clutterbuck, jun. of Watford, washed the walls of his hot-house with a painter's brush, dipped in a solution made of four ounces of sublimate, in two gallons of water; and since that application, neither the red spider, against which this remedy was employed, nor ants, have made their appearance.

One of the most effectual methods of dispersing these troublesome insects from plantations and gardens, we believe, is that mentioned in the *Encyclopædia Britannica*; on the authority of which we shall communicate it to our readers: "a small quantity of human fæces, when placed into their hills, will not only destroy great numbers, but expel the rest from their habitations."

Antelope. See Deer.

Anthemis. See Chamomile.

Anthericum. See Spiderwort.

ANT-HILLS are so well known, that they require no additional description to that given under the article Ant.—They are very injurious to dry pastures, not only by wasting the extent of soil which they cover, but by impeding the scythe at the time of mowing, and yielding a poor food, pernicious to cattle. The manner of reducing them, simply consists in cutting them into four parts, from the top, and then digging deep enough to take out the core below, so that when the turf is replaced, it may be somewhat lower than the level of the rest of the land: thus the place will be more wet, and the ants prevented from returning to their former situation. The earth taken out should be scattered, or removed to a considerable distance, lest they might collect it, and soon form another hill. This useful kind of work ought to be performed in winter; for if, at that season, the places be left open, the frost and succeeding rains will destroy those ants which are in the lower part of their habitation. In Hertfordshire and Somersetshire, a particular kind of spade is used for this purpose; its blade is very sharp, and so formed, that the whole edge describes about three-fourths of a circle.

St. Anthony's Fire. See Erysipelas, or Rose.

Anthoxanthum odoratum, L. See Sweet-scented Spring-grass.

Anthyllis vulneraria, L. See Kidney-Vetch.

ANTIDOTES, are medicines which prevent or cure the effects of deleterious substances, either taken into the stomach, or externally applied to the human body.

Of those poisons which generally prove mortal, when swallowed, the principal are, arsenic, corrosive sublimate, glass of antimony, verdigrease, and lead. Mineral poisons apparently attack the solid parts of the stomach; and, by eroding its substance, occasion death. Antimonials rather injure the nerves, and destroy by producing convulsions. Most vegetable poisons seem to operate in this manner; but fatal accidents more frequently happen from the former.

In the year 1777, M. Navier advised large quantities of milk to be administered to persons who had swallowed arsenic; a metal, the virulence of which is effectually counteracted by this liquid, as it allays the irritation of the viscera, and prevents the inflammation of the intestines. The patient is afterwards directed to take a dram of the liver of sulphur in a pint of warm water; but when this cannot be procured, he may substitute a gently alkaline lixivium, or soap-water, a solution of iron in vinegar, or any other acid, or even a portion of ink, if nothing else can be readily procured. The cure may be completed by the constant use of milk and warm sulphureous waters.—See Arsenic.

The remedies most suited to obviate the effects of corrosive sublimate, are different preparations of the liver of sulphur, which decomposes or resolves the mercurial salt; and, by the addition of the alkali to the acid, forms an inoffensive neutral salt. Acids, therefore, even of the mildest kind, are fatal, if applied to counteract this poison, as they render it more active: thus, even lemonade, or treacle, are pernicious, as they contribute to increase pain and danger. Common salt dissolved in water, readily precipitates the mercury, and thereby greatly abates its virulence. This article being always ready, it ought to be resorted to preferably to any other; especially as, when taken in a large quantity, it operates as an emetic, or carries off the mercury by stool.

Volatile and fixed alkaline salts and spirits, also precipitate mercury, such as spirits of hartshorn, or sal ammoniac, salt of tartar, wormwood, &c.; but, as these can seldom be obtained on an emergency, the following articles may be substituted, viz. pot-ashes dissolved in warm or cold water, but the lixivium should not be too strong. When pot-ashes are not at hand, warm water may be strained through ashes of bean-stalks, broom, straw, or any other vegetable that can be most readily burned. White or black soap should be injected by way of clyster, and likewise dissolved in all the water that is drunk.

Those poisons which may be called *culinary*, are perhaps the most destructive; because they are generally the least suspected. No vessels therefore which contain *copper* in their composition, should be used in cookery, &c. In cases where the poison of verdigrease has been recently swallowed, emetics should first be given, and afterwards cold water gently alkalised, ought to be drunk in abundance.

Though *lead* may not be considered as corrosive poison, its effects are nevertheless deleterious, and may be corrected by the remedies already suggested, namely, by drinking large quantities of acidulated liquors, or solutions of the liver of sulphur, and completing the cure by gentle laxatives; but, in the commencement of the complaint, drastic purgatives should be carefully avoided.

The poisonous effects of mineral acids may be counteracted by the administration of calcined magnesia. M. DESGRANGES relieved a soldier in the agonies of death, who had swallowed a glass of the sulphuric acid, or oil of vitriol, by prescribing the following antidote, viz. a dram and a half of the carbonate of magnesia *(magnesia usta aërata)*, dissolved in a tea-cupful of pure water. This dose produced excessive vomiting. He repeated the magnesia in the quantity of half a dram every half hour, giving at intervals a solution of gum-arabic and sugar till the cure was accomplished.

To obviate the ill effects of *opium*, emetics should be given as speedily as possible. If the first symptoms only appear, which are the same as those of intoxication, the following emetic will be of service, viz. Simple spearmint-water and oxymel of squills, of each one ounce, and half a scruple of ipecacuanha: frequent draughts of water-gruel should be given, to assist the operation. If the poison has been swallowed in a liquid state, which may be ascertained from the smell of the first discharge, four or five vomitings may be sufficient; but if in a solid form, two or three more must be procured, by giving fresh doses. Should the symptoms continue violent, it will be necessary to increase the quantity of the medicines, in proportion to the urgency of the case, and the strength of the patient. The principal object to be kept in view, according to Dr. SEAMAN, is, to produce such a degree of irritation, as may counteract the narcotic effects of this deleterious drug. Hence it is very useful to stimulate the nostrils with spirits of hartshorn, and to apply friction with salt over the whole body.

Lemon juice, a solution of white vitriol, and other acid substances, have long been considered as effectual antidotes against opium; but they do not afford sufficient security.

As we seriously advise all persons in this unfortunate situation, immediately to avail themselves of medical assistance, it would be needless to expatiate farther on the subject: we shall only observe, that there is a remedy at once simple and effectual for all kinds of poisons, to be found near every cottage, as well as in the palaces of the great. This is pure water, which, when taken at an *early* period, and in *sufficient quantity*, has the beneficial tendency of diluting and neutralizing most of the poisons introduced into the stomach.

With respect to those vegetable substances which sometimes, though rarely, require antidotes, we shall in this place mention the following: 1. Camphor; 2. *Arnica*, or German Leopard's-bane; 3. *Cocculus Indus*, or India berry; 4. Gamboge; 5. *Datura stramonium*, or Thorn-apple; 6. *Veratrum album*, or White Hellebore;

and 7. *Mezereum*, or Spurg Olive. Against the violent operation of these medicinal drugs, Professor HUFELAND, of Jena, at present physician to the KING of PRUSSIA, has from experience found, that the first is most effectually counteracted by taking internally proportionate doses of opium; the second, by the copious use of vinegar; the third, by moderate portions of camphor; the fourth, by swallowing alkaline solutions in water; the fifth, by either vinegar, or the acid of lemons; the sixth, by strong decoctions of coffee; and the seventh, by camphor.

There are, however, many other vegetable, animal, and mineral substances, sometimes taken by mistake, or administered from malignant motives, and the fatal effects of which may be obviated by a timely use of their respective antidotes.—In order to conclude this article, within its due limits, we are obliged to refer the reader to the following heads, where he will find each subject discussed as it occurs in the order of the alphabet, viz. BALSAMINE SEEDS, CASSAVA, COLOQUINTIDA, WATER-CROWFOOT, WILD CUCUMBER, BEARDED DARNEL, EUPHORBIUM, SPANISH FLIES, FOXGLOVE, GLASS, GYPSUM, HELLEBORE, HEMLOCK, HENBANE, LEAD, LEADWORT, LIME, LOBSTERS, PUTRID MEAT, METALLIC, POINTED SUBSTANCES, MUSCLES, DEADLY NIGHTSHADE, *Nux vomica*, OYSTERS, MEADOW SAFFRON, SALTPETRE, SCAMMONY, SOWBREAD, STAVESACRE, WOLF'S-BANE, and POISONS in general.

ANTIMONY is a heavy, brittle semi-metal, composed of long bright streaks, resembling needles, of a dark lead colour, and without taste or smell. It is found in Germany, France, and also in England; but that produced in this country is the least proper for medicinal uses, being frequently mixed with a portion of lead. The impurities which are found in the foreign sorts, are of the infusible stony kind, and are extracted by melting the antimony in vessels, the bottoms of which are perforated with small holes, so that the lighter and drossy matter rises to the surface, while the more pure and ponderous sinks, and is received into conical moulds. This mineral, when analyzed, is found to consist of a metal united with common sulphur. It is the basis of many preparations to which we shall refer our readers, and simply mention a few of the purposes to which it is subvervient, while in a crude state.

The ancients employed it in eye-water, for inflammations of the eyes, and for staining the eye-brows black. Previous to its establishment as an internal remedy, which was not till towards the conclusion of the fifteenth century, it was generally supposed to be poisonous; but experience has at length fully evinced, that it possesses no noxious qualities, being often successfully used, especially in chronic eruptions; and though many of its preparations operate as violent emetics, and cathartics, yet by a slight addition or alteration, they may be easily deprived of their virulence, and rendered safe and mild in their operation. Its virtues are completely extracted by wine; from ten to fifty or sixty drops of which are usually prescribed as an alterative and diaphoretic. In larger doses, it acts as a diuretic and cathartic; and three or four drams prove, in general, violently emetic.

For this last purpose, it has been frequently employed in madness and apoplexy.

Dr. James Walker, late surgeon to the navy, gives a remarkable account of the effects produced by a large quantity of antimonial wine. Having ordered some whey, in consequence of a cold, that wine, in a mistake, was used instead of Lisbon. Of this whey he drank a full English pint, in which was contained not less than a gill and a half of antimonial wine; but, instead of producing the effects which might naturally be expected, it was attended with an unusual propensity to sleep, with a lassitude and numbness of the limbs. His two medical pupils, who had eaten the curd, were affected in a similar manner. He consequently asks, "Whether, if its emetic quality be destroyed by its combination with milk, and exchanged for that of a narcotic kind, some useful hints might not be drawn from this case, and introduced into medical practice?"—See James's Powder, and Tartar Emetic.

ANTIPATHY, in physiology, is used to express the natural aversion which an animated or sensitive being feels at the real or ideal presence of any particular object. Such are the reciprocal hostilities subsisting between the toad and the weasel; between sheep and wolves; the aversion of particular persons against cats, mice, spiders, &c.

This prepossession is sometimes so violent as to induce fainting, even upon beholding their natural enemies. Most animals likewise evince a remarkable antipathy to the sight of the blood of their own species.

To explore this subject, without prejudice, it will be necessary to exclude those antipathies which are not authenticated, such as those between the weasel and toad, which can be extinguished or resumed at pleasure; or those, the causes of which are evident;—we shall then be inclined to admit but a very inconsiderable number.

The aversion which prevails between the sheep and the wolf, cannot certainly be called an *antipathy*, as its origin is obvious: the latter devours the former, and every animal naturally shuns pain, or destruction. From similar causes proceeds that dread which many persons feel of serpents and reptiles. During the period of infancy, pains are taken to impress the mind with the frightful idea that these animals are of a venomous nature, and that their bite is mortal. Such apprehensions are aggravated by the relation of dismal tales, which often make a lasting impression. When others, at their approach, have exhibited symptoms of terror, we have been persuaded to avoid them; and hence it is not surprizing that we should entertain an aversion from such objects. Our emotions at the sight of what we fear, being excited while we are unprepared, will be in proportion to the sensibility of our frame, and the irritability of our nerves.

A person, who formerly had no dislike to particular objects, by associating with those who are subject to such idle fears, often acquires an unfavourable bias against things which, prior to those contagious examples, he beheld with perfect indifference. Thus, many evince an aversion to eels, which, however, arises chiefly from their resemblance to serpents.

There are other antipathies, which do not originate from the source of the imagination, but from some natural loathing, such as is often perceptible in children, for particular kinds of victuals, which, though not distasteful, yet, from a weakness of the digestive organs, are disgorged as soon as swallowed.

Antipathies, in general, owe their origin to objects which are conceived to be dangerous; to a terror of imaginary disasters; to a squeamish delicacy; and to a rooted dislike of things supposed to be detrimental. Those of children are to be conquered by teaching them the means of defence and security, or the methods of avoiding the influence of noxious agents; and, when age has strengthened the judgment, by demonstrating to them the nature and properties of those natural bodies, or phenomena, which they fear, they will thus gradually overcome their early prejudices and antipathies.—See SYMPATHY.

ANTIQUITIES is a term signifying those testimonies, or authentic records of the early ages, which are transmitted to posterity by tradition.

The study of antiquities forms a very extensive science, including an historical survey of the ancient edifices, magistrates, offices, habiliments, manners, customs, ceremonies, religious institutions, &c. of the various nations of the earth. It is equally useful and interesting to the lawyer, physician, and divine.

Antiquarian science may be divided into sacred and profane, public and private, universal and particular.

The antiquities of Greece and Rome attract the curiosity of every scholar; and though including the history of the Jews, Egyptians, Persians, Phœnicians, Carthaginians, and in short, every celebrated nation, they, by no means, contain the whole of this branch of learning. For, if to the general be added a particular acquaintance with statues, *bas reliefs*, medals, paintings, and the venerable remains of ancient architecture, this aggregate information constitutes a very interesting and extensive science.

To acquire a knowledge of the works of sculpture, statuary, graving, painting, &c. which are called *antiques*, strict attention ought to be paid to the substance, on which the art has been practised; as wax, clay, wood, ivory, stones, marble, bronze, and every kind of metal: because, on comparing this with the subject, it frequently serves to discriminate the true from the counterfeit specimens.

Many of our great antiquaries (who are not the most skilled in designing) frequently grant the preference to the ancients, rather from prejudice than judgment. That striking peculiarity which to them appears so marvellous in the works of antiquity, is often a mere chimera: for most of the antique figures and statues are totally void of expression, and we can only fancy their characters.

We are, however, greatly indebted to the persevering exertions, and the laudable spirit of inquiry, which have lately been displayed by the Royal Antiquarian Society; inasmuch as the Members of that learned and patriotic body have individually, and collectively, contributed to the acquisition of those valuable materials which are now converted to their proper use. Mr. BURGESS, in his ingenious Essay "*On the Study of Antiquities*," printed in 1783, justly observes, that "this study, once far removed from all the arts of elegance, is now become an attendant on the Muses, and a handmaid to History, Poetry, and Philosophy."

Antirrhinum. See SNAPDRAGON, FLUELLIN, and TOADFLAX.

ANTISCORBUTICS signify those applications and medicines which are found useful in the cure of the scurvy, such as pure air, gentle exercise, milk, vegetables, fruit, &c.—See SCURVY.

ANTISEPTICS, a term applied to those substances which resist or check putrefaction.

Prior to the experiments made by Sir JOHN PRINGLE, for the purpose of ascertaining in what manner bodies are resolved by putrefaction, and the means of accelerating or retarding that process, there prevailed a general notion, that alkalies and volatile salts were of a putrescent tendency. The result of his investigations, however, has demonstrated that this opinion was erroneous; and that there are considerable antiseptic virtues in these salts. Indeed, daily experience has evinced, that volatiles, when applied to the organs of smell, or taken in substance, are perfectly harmless; and yet a strong prejudice has hitherto prevailed against their use; from a supposition that these salts, being the produce of corruption, are apt to accelerate putrefaction. Respecting their internal use, nothing decisive can be maintained, unless the nature of the disease be accurately defined. For admitting they have a tendency to promote putrefaction, yet in the languor and obstruction which usually mark its commencement, volatiles, from their aperient and stimulating qualities, may be the means of arresting its progress; and, on the contrary, even though they were antiseptic, yet where the humours are disposed to corrupt from excess of heat or motion, these salts, by supporting the cause, may aggravate the malady. Hence the only criterion of ascertaining the point, is to inquire whether they accelerate or retard putrefaction, when externally brought in contact with muscular fibres. To decide this question, repeated experiments have been instituted, by uniting salt and spirit of hartshorn with various animal substances, and the constant result was, that, so far from promoting, they uniformly retarded the putrefactive process. From these facts we are sufficiently warranted to conclude, that when internally taken as a medicine, and with a proper application to the case, they are likewise antiseptic.

Numerous trials have also confirmed the antiseptic properties of fixed salts, though they appear to be inferior to some resinous substances, and other vegetables. Thus myrrh, in a watery menstruum, has been found twelve times more antiseptic than sea-salt. Two grains of camphor was a better preservative of flesh than sixty grains of common salt. An infusion of a few grains of powdered Virginian snake-root, exceeded in antiseptic property twelve times its weight of chamomile flowers; and the Peruvian bark possesses nearly the same extraordinary quality. These balsamic vegetables are the more valuable, as they are usually free from acrimony, and may be taken in much greater quantity than either spirits, acids, resins, or even neutral salts.

To the class of antiseptics we may also add fermented liquors, acids, vinous spirits, and even those plants called ant-acids, which formerly were erroneously supposed to accelerate putrefaction, particularly the scurvy-grass and horse-radish.

Antiseptics are prescribed in all putrid and malignant diseases, though not without due precaution, as to the proper time for their exhibition, and the different stages of the disorder. Thus, for instance, bark is a specific in mortifications, or gangrene, when the vessels are relaxed, and the blood disposed to putrefy; but will be unavailing, when the intestinal canal is obstructed, or if there prevail a preternatural tension and fulness. In cases where astringent remedies cannot be employed with safety, contrayerva, snake-root, camphor, &c. may serve as excellent substitutes.—See PUTREFACTION.

ANXIETY is that state of the mind in which it is uneasy about some future event; either from an apprehension of danger, or a solicitude of being relieved from suspense.

The causes of anxiety may be various; but, in general, they arise either from too long continued and forcible an impression of external objects, or a diseased state of the nerves, in which they are liable to be too powerfully affected by the usual action of such objects.

Concerning the effects of this mental disorder on the human system, we agree in opinion with the late Dr. W. BATTIE, that they are particularly obvious from the spasmodic strictures which seldom fail to accompany persons subject to that afflictive passion: hence palsy, asthma, and similar complaints. When the body is thus constantly influenced by an excess of sensation, it may be easily conceived that its consequences on a tormented mind, or deluded imagination, must frequently be serious and incurable.

Dr. ARBUTHNOT appears to confound the cause with the effect of anxiety, when he advises to allow febrile patients, troubled with *anxieties*, "a warmer regimen, after the cold fit is over;" while he recommends "spices as useful, because anxieties often happen by spasms, from wind." The futility of this advice is evident; for though aromatics, or carminatives, will undoubtedly afford a temporary relief from flatulency, yet the cause will not only remain, but even be more deeply rooted into the system, by this mode of treatment.

A more effectual remedy for obviating the causes of anxiety, in a *healthy* state of the body, is perhaps the following: When persons of a settled age are too anxious in all their expectations and undertakings, it will only be necessary to enlighten their contracted minds, by teaching them to form a proper estimate of those things which, in a moral point of view, are of little consequence to human happiness. Thus instructed, they will learn more reasonably to appreciate their own merits; and, by comparing these with the frequent failure of success in others, who have excelled them in virtuous as well as in useful deeds, they will gradually be enabled to reduce their own expectations to a proper standard.

APE, in zoology, an animal of which we find more than fifty species: it is more remarkable on account of its peculiar instinct, bodily structure, and habits of life, than from either its dangerous or useful tendencies.

Apes were formerly considered as a degenerated cast of mankind, because some of them, such as the *troglodytes*, or the African woodman, and the *ourang-outang*, bear a great resemblance to the human form. These creatures, and especially the former species, are gregarious, inhabit the thickest forests, are from four to five feet in stature, very ferocious and strong, and do not hesitate to attack even men. Several of those audacious bipeds possess such a degree of muscular strength, that ten unarmed persons are inadequate to the task of reducing one of them to obedience.

On a close examination of their external shape, however, and particularly of the head, it clearly appears that their structure is essentially different from that of our species. From the natural constitution of their bodies, they are not only deficient in the organs of speech, but do not even display the sagacity of dogs, not to mention that dignified criterion between man and the inferior animals—reason. As an instance of their deficiency of judgment, we shall only mention, that, notwithstanding their excessive fondness of enjoying the warmth and light of a fire in the woods, made by the natives, who seldom take the trouble of extinguishing it, those whimsical imitators have not even the ingenuity of supplying it with fuel; and therefore afford no proof of their reasoning powers.

Nevertheless, they are justly entitled to the next place to man, when we consider some extraordinary qualifications with which they are preferably endowed. Of this nature is their uncommon talent of imitation, which, to them, is so far from being advantageous, or conducive to their safety, that it is ingeniously employed for ensnaring them into captivity. Thus the Indians wash their faces in the presence of apes with water, for which they substitute a solution of glue, or gum arabic: on leaving the vessel with this seductive liquor, the animal, without suspicion, imitates the natives, and being neither sensible of the danger attending this experiment, nor the means of preventing the effect, its eyes are soon pasted up, and it is exposed to the mercy of its enemy.

Besides making good use of their teeth and nails, apes defend themselves with branches of trees, stones, and the like.—Their maternal affection is so great, that they frequently smother the dearest of their offspring; and hence it has been proverbially applied to mothers who spoil their children, by excessive indulgence in the articles of food and drink.

APERIENTS, in medicine, signify those substances which possess a gentle, purgative quality, and facilitate the circulation of the fluids, by removing obstructions.—See Laxatives.

Aphanes Arvensis, L. See Parsley-piert.

Aphernously. See Arvenusly.

Aphis. See Plant-louse.

APHORISM is a term used to denote either an unconnected maxim, or a short pointed sentence, comprising much in a few words. It is at present chiefly used in medicine, and law: thus we say, the Aphorisms of Boerhaave, Hippocrates, of the Civil Law, &c.

It would be highly conducive to the progress of learning, if all elementary works, which treat of any particular art or science, were written in an aphoristic form, so that every detached fact, or assertion, might be reduced to a distinct proposition.

Aphthæ. See Thrush.

Apiary. See the article Bee.

Apium graveolens, L. See Smallage.

APOPLEXY is a disease in which the patient is suddenly deprived of sensation, and incapable of voluntary motion. Although nosologists have included several other affections of the head, under this denomination, yet it is usually divided only into two kinds, the *sanguineous* and the *serous*. The symptoms which distinguish the former, are a sound sleep, preceded by giddiness, and attended with snorting, noise in the ears, corruscations before the eyes, and redness of the face. If any thing be put into the mouth, it is immediately returned through the nose; nor can it be swallowed unless the nostrils be closed, in which case there is danger of suffocation. If the patient appear insensible, there is but little hope of his recovery. Sometimes the consequence of this attack is hemiphlegia, or palsy of one side of the whole frame, which is evident from a distortion of the mouth towards the sound side, a contraction of the tongue, and stammering of speech.

The general cause of sanguineous apoplexy, is a plethoric habit, with a peculiar determination of blood towards the head. Whatever tends to accelerate the circulation, such as surfeits, intoxication, immoderate exercise, and violent passions of the mind, may sooner or later occasion this disease. It seldom, however, occurs till persons have passed the age of sixty, and after a fulness of the veins has for a long time prevailed in the system. In many instances, it proves fatal on the first attack; and few survive a repetition of the fit. Those who apparently recover, are frequently carried off, without being warned of its approach.

The usual method of treatment consists in placing the body in an erect posture, and supporting the head in that situation; in copious and repeated bleedings from the jugular veins and temporal arteries, cupping, and the application of blisters to the head, or between the shoulders.

In the serous, or watery apoplexy, the pulse is small and feeble, the complexion pale, and there is a diminution of natural heat.—Upon dissection, the ventricles of the brain have been found to contain a larger quantity of fluid than they ought in a natural state. This species is equally fatal as the other, and may arise from any cause which induces a debilitated state, such as mental depression, excessive study, long watching, &c. It may also be occasioned by too plentiful an use of acidulated drinks. In this alarming complaint, bleeding cannot be attempted with safety: acrid stimulating purgatives, and emetics, have been employed with a view to carry off the superabundant serum; but, in debilitated habits, they are liable to strong objections. Volatile salts, cephalic elixirs, and cordials, are usually prescribed; which, if a hemiphlegia supervene, may be aided by aperient ptisans, cathartics, and sudorifics, gentle exercise, especially in a carriage; blisters, and such other stimulating medicines, as are proper in paralytic affections.

The opinion, that the immediate

cause of apoplexy is an extravasation of fluids, or a preternatural fulness of the vessels, has afforded a subject of much controversy among medical writers. To refute this conjecture, they have quoted an instance of the hydrocephalus, or dropsy of the brain, where the head was increased to more than double its natural size, without producing one apoplectic symptom. LE CAT, in his ingenious Reflection, published in the *Philosophical Transactions*, relates, that, when he opened the head of M. de FREQUIENNE, late president of the Parliament of Paris, who died of an apoplexy, he found about a tea-spoonful of blood extravasated between the third and fourth ventricles of the brain: hence LE CAT deduces the impossibility of so trifling a quantity being capable of pressing on the *origin* of the nerves, so as totally to intercept the course of the animal spirits. According to this writer, the extravasated blood, usually found in the brain of a person dying of an apoplexy, so far from being the cause of death, is an accident owing to the convulsive motions of the *dura mater* (a strong membrane, covering all the cavity of the cranium) as well as the vessels of the whole basis of the skull; and that, in general, it is occasioned by the matter of gout, or rheumatism, settling on this source of the nerves. The swelling and distension of the *dura mater*, causes a stagnation of the blood vessels of the brain, some of the weakest of which burst, while all the canals of the nerves become constricted and closed; a circumstance which sufficiently accounts for the consequent fatal event. It will not surely be contended, that these ruptured vessels concur in the production of those spirits which impart motion to the heart, as it is well known that this organ receives the influence of numerous nerves at a time, all which ought to share in an accident consisting merely in the rupture of a capillary vessel.

These reflections are here offered, to repress that hypothetical confidence which many practitioners profess for their theories; and to discountenance the precipitate and excessive use of the lancet. This practice is plausibly suggested by an idea, that it is too great a proportion of blood which destroys the patient; but, besides that so ill-founded an opinion may prove fatal to those persons who are liable to apoplectic attacks, a prejudice in favour of the theory may prevent others from inquiring into the true cause, and discovering the remedies adequate to the cure of that fatal disorder.

In HEISTER's *Medical Observations*, a case is related, of a person who died of an apoplexy, in consequence of his being constantly exposed to the scent of three or four flower-pots of white lilies, which were kept in his chamber. This melancholy fact should deter those to whom such odours are sensibly prejudicial, from continuing long within the sphere of their deleterious influence.—See DROPSY OF THE BRAIN, and EPILEPSY.

APOTHECARY, is an appellation given to persons who vend and compound medicinal drugs; though most of them likewise prescribe for diseases, and attend patients, as well in slight as in the most dangerous cases. We forbear to animadvert upon the propriety, safety, or expediency of the latter practice.

The apothecaries of this country, however, are, almost without exception, men of a liberal and scientific education. They were incorporated into a company, by a charter obtained from JAMES I. at the solicitation of Drs. MAYERNE and ATKINS; previous to which time, they formed a part of the Grocers' Company. By an act, which was made perpetual in the 9th year of GEORGE I. they are exempted from serving upon juries, and from parochial offices. Their medicines are compounded from the formulæ prescribed in a printed dispensatory; and their shops may be visited by the censors of the Royal College of Physicians, who are empowered to destroy such articles of the materia medica, as they think either damaged or unfit for use. This power, however, is rarely, if ever, exercised. There is now established a handsome Apothecaries' Hall, in Blackfriars, with two fine laboratories, from which the surgeons' chests are furnished with medicines for the Royal Navy.

APPETITE, in general, signifies the natural instinctive desire, by which the animal is led to pursue the gratifications of sense. In the present instance, however, we shall confine its meaning to the craving for food. In this respect, the appetite of man may be divided into three different species, though that evinced by inferior animals is naturally simple, because it is not impaired by art. Thus, if children were never enticed, by weak parents, and ignorant nurses, to eat more than their own inclination directs them, or to partake of highly flavoured artificial dishes which stimulate the palate, and preternaturally distend the stomach, there is every reason to believe, that the following classification would be necessaay:

1. The *natural* appetite, which is contented, as well with the most simple as the most compound and delicious dishes: such is that of country people employed in hard manual labour: of children who have not been mismanaged in the nursery; and of every rational person who is convinced of the advantages resulting to both mind and body, from a simple and frugal diet.

2. The *artificial* appetite of the epicure, the hypochondriac, and the tipler; all may be ranked under the same class. It would be needless to add, in this place, any other remark, than that such an inclination for sensual enjoyment remains only so long as the operation of these exquisite stimulants continues. When the papillary nerves of the palate can be no longer influenced by such excitement, the sensualist loses his appetite, and is punished with all the concomitant symptoms of indigestion.

3. The *habitual* appetite, though partly acquired, is not liable to those serious objections which apply to the latter species; nor is it attended with any other disadvantages than those arising from long-fasting, or an undue allowance of food on particular occasions. Thus, after fatiguing exercise, when the fibres of the digestive organs are already weakened, and the circulation of the blood to those parts is unusually increased, the nourishment then received can be digested only with great difficulty, and to the detriment of the body.

Want of appetite may proceed either from a defective energy of the stomach, originating more frequently from an immoderate quantity, than the improper quality, of food; or it may be occasioned by the sympathy of other diseased parts, such as the liver, bowels, uterus, &c.; or by intestinal worms, obstructions of the mesentery, and many other causes. Hence it will be understood, that there can be no *specific* remedy suggested to remove the complaint; but that the treatment must be regulated by the nature of the case, and the constitution of the patient. In general, however, the following hints deserve attention. When the stomach loathes wholesome food, and is troubled with habitual flatulency, and eructations of a bitter, rancid, or saline taste, it should be previously ascertained, whether an emetic be proper, or necessary, to evacuate its foul contents. Yet to determine this point, requires a degree of skill and experience which few persons in common life possess: on the other hand, the administration of a simple emetic may be attended with serious consequences. For this reason, we would previously recommend a change of air and diet; early rising in the morning; gentle exercise; abstinence from all hot drinks, particularly tea, punch, and hot broths, fat or hard meat, spirituous liquors, tobacco, &c.; to avoid the influence of depressing passions, such as excessive grief, fear and anxiety; and if this treatment, after having been rigorously pursued for several days or weeks, produce no change in the appetite, then to have recourse to gentle emetics, or rather to the operation of nauseating medicines. According to our experience, the powder of ipecacuanha, in the smallest doses of a quarter or sixth part of a grain, in a little cold water, repeated every ten minutes for two or three hours together, before breakfast, stands eminently recommended in disorders of this nature, and has seldom failed to be of service to phlegmatic or corpulent individuals, when continued for several mornings. But if there appear to be great fulness of the stomach, or bowels, attended with the symptoms before described, it will sometimes be necessary to give such an emetic as may, according to circumstances, at the same time relieve the bowels. A mixture of two parts of ipecacuanha wine and one part of antimonial wine, taken in single tea-spoonfuls every quarter of an hour, without any farther drink till it begins to operate, generally produces the desired effect.

After the stomach and bowels have, by such, or similar means, been evacuated, it will be useful to strengthen the tone of the fibres, by drinking small draughts of cold chamomile-tea, or an infusion of quassia, or simple toast and water well prepared, which last may be justly considered as one of the mildest and most grateful corroborants.

An *insatiable appetite* may arise from too great a distension of the stomach in early infancy; from an over-abundant secretion of the gastric or digestive liquor; from drinking large quantities of stimulating acid beverage, such as cyder, perry, butter-milk, &c. but especially from a bad habit of fast eating, without properly masticating hard substances. Hence the first maxim in diet should be, *to eat slowly*, in order to prevent a sudden distension of the digestive organs, and to allow sufficient time for the food to be duly prepared, and gradually mixed with the gastric juice. It would be superfluous to add any other suggestions, respecting the treatment and cure of this troublesome complaint, which, in the present times of frugality, cannot fail to find its own remedy.

The appetite for certain whimsical dishes, peculiar to females in particular states of the body, belongs to the articles, GREEN-SICKNESS and PREGNANCY.

APPLE-TREE, the common, or *Pyrus malus*, L. is too well known in this country, to require a minute description. It frequently grows to the height of twenty or thirty feet, and produces a considerable variety of fruit. Botanists are of opinion, that the wilding, or crab-apple of the woods and hedges, is the original kind, from the seeds of which the apple now cultivated was first obtained.

The varieties of this species are multiplied to some hundreds, in different places, all having been first accidentally procured from the seed or kernels of the fruit, and then increased by grafting upon crabs, or any kind of apple-stocks. Notwithstanding the numerous sorts, not above forty, or fifty, are reared in the nursery. Their fruit arrives at full growth in successive order, from July to the end of October, but comes to maturity only after gathering; and several of the winter kinds, may be preserved for many months.

Apples serve as excellent fruit for the dessert, the kitchen, and for making cyder. The following, which are most esteemed for eating, are ranged according to the successive order in which they ripen: the white juncating, margaret apple, summer pearmain, summer queening, embroidered apple, golden rennet, summer white calville, summer red calville, silver pippin, aromatic pippin, *la reinette grise, la haute bonté,* royal russeting, Wheeler's russet, Sharp's russet, the spine apple, golden pippin, nonpareil, and *pomme d'api.* Those for culinary use, are, the codling, summer marygold, summer red pearmain, Holland pippin, Kentish pippin, *courpendu,* Loan's pearmain, the French rennet, French pippin, royal russet, monstrous rennet, winter pearmain, *pome violette.* Spencer's pippin, the stone pippin, and oaken pippin. Those most esteemed for making cyder, are, the Devonshire royal wilding, red-streak apple, whitsour, Herefordshire under-leaf, John-apple, or *deux ames,* everlasting hanger, and gennet moyle.

Among all the fruit growing in this country, says a celebrated botanical writer, apples justly deserve the preference. In raising these useful trees for orchards, or fields, whether for cyder or baking, the wild crab-kernels are the most suitable, as they yield hardy stocks, which are better able to endure cold and coarse lands, take firmer root, and produce larger trees. Where these seeds cannot be conveniently procured, the kernels of common apples may be substituted, especially with a view of ingrafting them. Although the former do not bring forth trees bearing the same kind of apples, yet they thrive without grafting, and their hard fruit may, notwithstanding its astringent and acid properties, be advantageously converted into cyder.

Culture.—The method of propagating the cyder fruit-trees in Herefordshire, is by grafting. Very large, and even old trees, may be grafted, so as to bear fine heads of other sorts; and thus they will produce a crop of fruit quicker than by any other method. New orchards are raised by planting well-grown crab-stocks, and grafting them the year after.

If the trees are full sized, the tops of them must be cut off in winter, otherwise when grafted, they will, as it is termed, *bleed* so much, that the grafts will not succeed. The trees should not be cut down to the trunk, but as many branches must be left as look kind above, where it branches out about the thickness of one's arm; the tops of these must be taken off, about two or three feet above the part where they project from the trunk. Good crab-stocks, for raising new orchards, generally cost from 1s. 6d. to 4s. each, according to their quality.

LINNÆUS considers the apple and the quince as species of the pear-tree, or *Pyrus*, all the varieties of which are hardy, and will succeed in any common garden soil, if planted in a free situation. They are propagated by grafting and budding upon any kind of pear-stocks, occasionally upon quince, and sometimes upon white-thorn stocks.

Apples of every kind may be reared in the manner above described: and, according to Dr. ANDERSON, the pure paradise-stock is the best graft. They will not thrive, however, in a low and moist soil, where they are apt to canker, and speedily decay. In a friable loam, they generally prosper extremely well.

Pruning.—If a tree be very old, and much incumbered, the stumps, with all the decayed, rotten, and blighted branches, should be carefully removed: but, instead of delaying this operation till the trees become too old, it ought to be commenced even in the nursery, and regularly continued; as, by the use of medications, the wounds will heal, without causing any blemishes.

When the trees are so luxuriant, as not to bear those prolific spurs from which the fruit proceeds, the too abundant flow of their juices must be checked by the following method:—the tops of most of the shoots are to be pruned off in August, the bark perpendicularly slitted in different places, and the trunk cut about one-third through with a saw, but so as not to injure the heart. For the first year, or two, after this experiment, the tree will not bear more fruit than usual, but afterwards its production will be adequate to every expectation.

From this operation, a still further benefit may be derived. When there is a superabundance of moisture, the trees are liable to be covered with moss, which affords shelter for caterpillars and other insects; but this process in a great measure cures it, especially if the moss be carefully scraped off, or rubbed with a coarse, wet cloth.

The pruning of the tops diverts the channel of circulation, and accelerates the growth of the fruit-bearing shoots; while the cutting of the trunk, across, moderates the great rise of nourishment, or sap. Thus the sawed part will overgrow in so complete a manner, that it cannot be discerned, except from the freshness of its bark.

Apple Blossoms are, in some seasons, injured by the devastations of an uncommon number of insects, produced from a species of black flies which deposit their eggs in the bud, at its first opening;

and

and which, by feeding on the heart of the bud, soon occasion it to contract, and drop. To remedy this fatal effect, Mr. C. CULLETT advises to collect heaps of long dung, wet straw, weeds, &c.; to dispose them in different parts of the orchard; and set fire to the heaps in that quarter from which the wind blows, so that the smoke may thoroughly fumigate all the trees. Thus the insects, which are supposed to be brought by the wind, will be prevented from depositing their eggs.

As very serious apprehensions were lately entertained in the cyder counties, that the moss growing on apple-trees, and the millions of insects which harbour in it, might be destructive to orchards, we shall here insert another remedy discovered by Mr. TENCH, of the Minories: "Take a quantity of unslacked lime, mix it with as soft water as your situation will furnish, to the consistency of very thick white-wash; this mixture, with a soft paint brush, apply to your apple-trees, as soon as you judge the sap begins to rise, and wash the stem and large boughs well with it, observing to have it done in dry weather, that it may adhere, and withstand rain: you will find, that in the course of the ensuing summer, it will remove all the moss and insects, and give to the bark a fresh and green appearance, and that the tree will shoot much new and strong wood; at least, it did so in Nova Scotia. The trial is simple, and can neither be attended with much expence, trouble, or danger."

In justice to Mr. FORSYTH, His Majesty's gardener at Kensington, we cannot omit to mention his composition, used for the same purpose, and, perhaps, of superior efficacy, if the nature of its ingredients be considered: To one hundred gallons of human urine, and one bushel of lime, add cow-dung sufficient to bring it to the consistence of paint.—After having carefully brushed off all the moss, the affected trees should be anointed with this mixture, about the latter end of March; which simple precaution, it is said, fully answers the desired effect.

Concerning the *physical properties* of apples, it deserves to be stated, that beside their aromatic qualities, they are wholesome and laxative, when fully ripe. In diseases of the breast, such as catarrhs, coughs, asthmas, consumptions, &c. they are of considerable service to neutralize the acrimony, and attenuate the viscidity of humours: for these beneficial purposes, however, they ought not to be eaten raw, but either roasted, stewed, or boiled. Even crab, or wood-apples, may be usefully employed in decoctions, which, if drank plentifully, tend to abate febrile heat, as well as to relieve painful strictures, in pectoral complaints.

With regard to their sensible properties, apples have been divided into spicy, acidulated, and watery. To the first class belong the various species of rennet, which possess a most delicate flavour, contain the least proportion of water, and, on account of their vinous nature, are not apt to excite flatulency. Pippins, on the contrary, though affording more nutriment than the former, are more fibrous, and consequently require a more vigorous stomach to digest them: hence they may be ranked under the second class. Lastly, those sweet and tender apples which are very juicy and palatable, are the least fit to be eaten in a raw state, unless with the addition of bread or biscuit: when baked, or dried in the open air, as is customary on the continent, they make an excellent substitute for raisins or plums, in puddings, pies, and other dishes prepared of flour.

Sour apples may be much improved, both in taste and quality, by either baking, or digesting them in a close vessel by steam, over a very slow fire: thus the saccharine principle is disengaged, and they undergo a complete change.

As apples are very liable to decay, especially in hard winters, various methods of preserving them have been tried, with different degrees of success.

One of the best expedients to preserve them for winter use, is, to let them remain upon the trees till there be danger of frost, to gather them in dry weather, and lay them in large heaps to sweat for a month, or six weeks. At the end of that time, they should be carefully examined; those which have the least appearance of decay removed from the others, the sound fruit wiped dry, and packed in large dry jars, and then closely stopped, in order to exclude the access of air. If this plan be properly followed, the fruit will keep sound for a long time: it is, however, frequently impossible to procure a sufficient number of jars for this purpose; hence, in considerable quantities, the following methods are generally adopted:

In North America, as well as in Germany, apples are often preserved during the most severe frosts, by placing them in an apartment immediately under the roof of the house, but without a fire; a linen cloth being thrown over them, before the frost commences. This experiment, however, has not succeeded in Britain.

In some parts, a coarse linen cloth is spread upon the floor of an upper room, and a layer of apples is placed on it; this is covered with a cloth of a similar texture, on which another layer is spread, and again covered: in this manner the pile may be increased to any height, with alternate strata of linen and fruit; after which a cloth, of sufficient dimensions to communicate with the floor on every side, is thrown over the whole heap. This practice has been attended with success.

Another method is, to put a layer of apples, and a layer of dried fern, alternately in a basket, or box (the latter is considered the best, as it admits less air), and cover them closely. The advantage of *fern*, in preference to straw, is, that it does not impart a musty taste.

Apples, in small quantities, may be preserved for a greater length of time by the following, than by any of the before-mentioned processes.—First, completely dry a glazed jar, then put a few pebbles at the bottom, fill it with apples, and cover it with a piece of wood exactly fitted, and fill up the interstices with a little fresh mortar. The pebbles attract the moisture of the apples, while the mortar excludes the air from the jar, and secures the fruit from pressure.

This useful fruit may likewise be occasionally preserved from frost, by placing one or two tubs, or pails of water, in the room where apples are stored, taking care daily to break the ice, and, if thick, to renew the water, which, having a much stronger attraction for cold, protects the apples.

Gathering.—This fruit should be gathered with the *hand*, and carefully placed in baskets; rejecting those which spontaneously fall, as unfit for long keeping. Moving the apples, in order to examine them whether sound, is likewise injurious to their preservation.

APPLICATION, in a general sense, signifies the art of bringing things together, in order to discover their mutual agreement or relation to each other. It is also familiarly used to express the study or consideration of any subject, and includes the idea of assiduity and persevering attention.

In the *Economy of Human Life*, we meet with the following short sentence, in praise of application: "Since the days that are past, are gone for ever, and those that are to come, may never appear, it behoveth thee, oh! man, to employ the present time without vainly regretting the loss of that which is past, or too much depending on that which is to come. This instant is thine; the next is in the womb of futurity; and thou knowest not what it may bring forth."

APPRENTICESHIP, is the binding of a person by covenant, to serve his master for a limited period, on condition of being instructed in his trade, or occupation. Its usual duration is for the term of seven years, after which the apprentice himself is entitled to become a teacher, and to engage pupils to serve under him.

The statute concerning apprentices was first enacted by Queen Elizabeth, but its operation was limited to market towns; as in country villages a person may exercise several trades, though he may not have undergone a seven years' servitude.

In Scotland, there is no general law to regulate their duration. The period varies, according to the established custom in different towns, and may frequently be shortened, by paying a small fine, which in many places is also sufficient to purchase the freedom of any corporation.

In France, the duration of apprenticeship is different in various trades. Five years was the time generally required in Paris; but, before a person can be qualified to become a master, he was in many instances obliged to serve five years more as a journeyman, and during this term he was called a companion.

Apprenticeships were unknown to the ancients. The Roman law makes no mention of them; nor is there any Greek or Latin word which expresses the idea now annexed to this appellation.

Dr. Adam Smith considers long apprenticeships as altogether unnecessary; because those arts which are superior to common trades, such as clock and watch-making, are not involved in so much mystery as to require a long course of instruction. Their first invention must, doubtless, have been the result of deep reflection and close application; but, since their principles are well understood, the lessons of a few weeks, perhaps, even of a few days, might be sufficient for the purpose of complete explanation. Manual dexterity, it is true, cannot, even in common trades, be acquired without much practice and experience. On the other hand, a young man would be more attentive and diligent, if from the commencement of a new pursuit, he were employed as a journeyman, and paid in proportion to the quantity of his labour. The master, indeed, would not be so great a gainer, because a considerable part of those wages which he now saves for seven years together, would necessarily fall to the share of the apprentice. In trades easily learnt, the latter would ultimately not derive any disproportionate advantages; for, as under such circumstances, he must expect many competitors, his wages would consequently, though gradually, be reduced. All trades, crafts, and mysteries, would thus experience a reasonable check of extravagant prices; and thus all conspiracies, and combinations of journeymen and masters, would be effectually prevented.

APRICOT-TREE, the *Prunus Armeniaca*, L. is a species of the plum, or cherry-tree. Although LINNÆUS has reduced these different trees to one genus, which he calls *Prunus*, yet we shall in this place enumerate only the varieties known under the name of apricot:

1. The *male*, or *early* apricot, which produces a small, round, reddish fruit; has more stone than pulp, ripens in July, and has but an indifferent flavour. As this tree blossoms early in spring, it is liable to be injured by night-frosts, against which it ought to be protected, by placing contiguous to it shallow vessels filled with water.

2. The *white* apricot is oblong, flat at both ends, and of a pale colour: its tree is not only less influenced by cold, than any other sort, but also bears fruit in greater abundance.

3. The *orange* apricot acquires, when ripe, a deep yellow colour, is distinguished by a sweet kernel, but its fruit is more fit for preserving, drying, and using it in pastry, than for the dessert.

4. The *red* apricot is of an oval size, its pulp likewise reddish and juicy, and the kernel sweet like a hazel-nut: the leaves of this tree are longer than those of any other variety.

5. The *large*, or Turkey apricot, exceeds in size and beauty all the other sorts, has a deep yellow pulp and sweet kernel, but is not productive.

6. The *Breda* apricot, a native of Africa, is one of the finest and most delicious: its fruit is large and round, externally of a deep yellow, and internally of a golden colour. Its kernel is the largest of the kind; and if this fruit arrive at maturity in an airy situation, it deserves an unqualified preference.

7. The *Brussels* apricot is of a middle size, somewhat oval; on its southern exposure red, with many dark spots, and greenish or deep yellow on the opposite side. Its fruit is firm, and of a delicious taste; the skin is apt to burst before the fruit is mature, and it seldom ripens until August or September. Some amateurs even prefer it to the preceding species.—Lastly:

8. The *peach* apricot is more spherical and larger than any other species; while it possesses the sweetness of the apricot combined with the acidulated vinous taste of the peach. This tree, however, requires a temperate climate, and will not thrive in the open air of this country.

Culture.—All the varieties of apricot-trees have originally been raised from their stones: they were then propagated by budding or grafting on any plum-stock. The soil most congenial to their nature, is a rich black mould; for they will not prosper in a loamy, sandy, gravelly, damp, or cold ground. As they are generally placed near walls, an eastern aspect will be the most eligible and proper, because they are apt to grow mealy, from the strong and constant heat of the sun, in a southern direction. In a luxuriant bottom, they may be planted at a distance of sixteen or twenty feet from each other; but in an inferior soil, from twelve to fifteen. When transplanted in the month of October, no other branches ought to be pruned off, except such as cannot be fixed to the wall. After the tree has been properly set in the ground, its branches should be loosely tied, and the surface of the soil surrounding the stem covered with good manure, partly to prevent injury from frost, and to afford more nourishment to the roots. Towards the end of February, or beginning of March, the branches must be untied, and the top of the tree cut off, while the operator's foot should be placed close to its trunk, and only four or five eyes are to be left above the place where it has been grafted: taking care that the oblique side of the cut be turned towards the wall.

During a dry spring, the roots may be occasionally watered, and covered with a little straw or grass plats, in order to protect them against night-frosts, and afford them additional moisture in summer. All the young shoots should be tied horizontally. About the end of September, the branches are again to be loosened, and pruned, so that two only may remain, one of a larger size, from eight to nine, and an inferior one, from five to six inches long.

In the second summer, all the straight shoots ought to be removed, as in the first, while the new sprigs are transversely fastened close to the wall, so that the trunk of the tree remain free: the pruning, however, should not be attempted later than in the course of April. About Michaelmas, the young shoots are again to be dressed, as in the preceding year; and the most vigorous left from eight to ten, but the weaker ones, only six or seven inches long.

A similar treatment must be pursued in the third and following years. It deserves farther to be remarked, that apricots bear their buds and blossoms not only on the branches of the preceding year, but likewise on the young shoots and tops of these branches: hence the dressing of them, during summer, ought to be performed with additional care.

Uses.—From the vinous and saccharine nature of this fruit we may readily conclude, that it is possessed of antiseptic, cooling, and nutritive properties; yet, unless fully ripe, it is apt to ferment and turn acid in weak stomachs, especially those of persons who are subject to flatulency and eructations: hence apricots ought to be eaten in moderation, with the addition of a little bread, and rather before, than after, meals. In short, they are more useful to bilious and plethoric, than to phlegmatic and hysterical individuals, or those troubled with hypochondriacal complaints.

In France and Germany, the orange apricot is usefully preserved in a dry state, for the winter, when it forms a delicious ingredient in pies, tarts, &c.

The kernels of several species of apricots contain a sweet oil, on account of which they were formerly, like sweet almonds, used in emulsions, and considered as vulnerary and anodyne: at present, however, their use is confined to external applications, in which the expressed oil of these kernels has sometimes been of service, for a contracted and chapped skin of the hands and lips, sore nipples, painful ears, and similar cases.

AQUA FORTIS, the nitrous acid of a certain strength, and so called from its dissolving power; but, when in a concentrated and smoking state, it is denominated *spirit* of *nitre*. It is made by distilling equal parts of crude nitre with calcined vitriol; or by carefully mixing one part of oil of vitriol with nine of pure spirit of nitre.—See Acids.

As this powerful liquid is used for various purposes in the arts and manufactures, but chiefly by dyers, brass-founders, hatters, &c. great caution should be observed, both in preparing and employing it, because it possesses a very caustic property, and its fumes are highly deleterious to the organs of respiration. Hence those artisans frequently become subject to convulsive coughing and blood spitting, paralytic affections, trembling, paleness of countenance, loose teeth, the loss of smell and taste, and at length, pulmonary consumption. In order to prevent these fatal effects, we seriously advise them to make use of oily and bland nourishment, and externally to secure the mouth and nose, by tying a handkerchief round those parts, while they are exposed to the fumes of this volatile acid.

But in casualties where a person has, by mistake, swallowed a portion of aqua-fortis, the following treatment will be the most proper for averting the imminent danger of suffocation. Immediately after the accident, luke-warm water ought to be drunk in the greatest possible quantity, even to the amount of several gallons, to weaken the causticity of the poison. Next, a solution of half an ounce of salt of tartar, or clean pearl-ashes, in one pint of water, should be taken in about six or eight small draughts; and as the effervescence thus occasioned in the stomach, greatly tends to weaken that organ, it will be necessary to make use of more water, and other diluent, oily, or mucilaginous drinks.

We are of opinion, that a solution of *borax*, or tincal, in the proportion of three drams to a pint of water, forms a more effectual antidote than the vegetable alkali; because the former, by uniting with acids, causes no effervescence.—There are instances of persons having completely obviated the ill effects of this poison, simply by drinking small portions of sweet oil, frequently repeated, for three days successively.

If, however, the sensation of a burning pain in the stomach and bowels should not subside, after plentiful vomiting, large draughts of sweet cow's milk must be swallowed, with the addition of one dram, or sixty drops of liquid tartar, usually called *oil of tartar*, to each pint. But previously to the expulsion of the poison by vomiting, or the neutralizing of it with alkaline solutions, neither milk, oily, nor saponaceous draughts can be taken with advantage. Hence these ought to conclude the cure; during which the patient may frequently use gargarisms and clysters of the same liquids, which are directed to be taken internally. Indeed,

deed, after the poisonous fluid has left the stomach, and entered the intestinal canal, the principal benefit will be derived from emollient and balsamic injections.

AQUA REGIA is a compound of the nitrous and marine acids, in different proportions, according to the purpose for which it is required; and usually made, by dissolving sal ammoniac, or common salt, in nitrous acid. When the former is employed, the usual proportion is one of this salt to four of the acid; but equal parts will be necessary to dissolve *platina*.

Aqua regia is used as a menstruum for gold: it likewise dissolves all other metals, silver alone excepted. The best kind for the abovementioned purpose, is a preparation of three parts of the pure marine, with one of the nitrous, acid. One hundred grains of gold require for their solution, two hundred and forty-six of this mixture.—Concerning the nature and cure of those casualties which may arise from an improvident use of this powerful solvent, we refer to the preceding article.

AQUA VITÆ is usually understood to signify either brandy, or spirit of wine, prepared simply, or with aromatics. Some, however, make a distinction; appropriating the term *brandy* to what is drawn from wine, or the grape; and aqua vitæ to that which is extracted from malt, &c.—See BRANDY.

Aquilegia. See COLUMBINE.

Arabic. See GUM ARABIC.

Arabis. See CRESS.

ARABLE LANDS, in general, are those naturally fit for tillage, or which may, by proper means, be prepared for the production of grain.

The just proportion between arable and pasture lands, has in this country, of late years, been much exceeded in favour of the latter. It is asserted by competent judges, that though the prevailing rage for breeding cattle of the finest quality, and to the greatest extent, has doubtless benefited the grazier, and the lord of the manor, yet this practice must certainly be attended with disadvantages to the community at large. We cannot, in this place, enter into a minute discussion of this important subject; but it clearly appears, from the present prices of corn, when compared with those of animal food, that they bear no *just proportion* to each other.

With respect to the general methods of improving arable land, we are induced to avail ourselves of the excellent remarks of M. DUHAMEL, who maintains that it is much more profitable to increase the fertility of land by *tillage*, than *manure*: 1. Because only a certain quantity of dung can be had; the produce of twenty acres being scarcely sufficient to dung one; whereas the particles of the earth may be pulverized and divided at pleasure: 2. Plants reared in dung, do not possess the fine flavour of those produced by a natural soil: 3. The plough not only separates the particles in a manner exactly similar to the fermentation occasioned by dung, but also changes their situation, by turning up the earth, and thus exposing the whole, at different times, to the influence of the sun, air, and dews; all which greatly conduce to render it fertile; 4. Dung breeds and harbours insects, which afterwards feed upon and spoil the plants. To remedy this inconvenience, he recommends the following expedient: "Let a reservoir of quick-lime be kept in a very a very dry place. When you begin to make your dunghill, sprinkle each layer of dung with quick-lime, till the whole is finished. This lime kills most insects, perhaps enriches the manure, and renders it more serviceable. It will likewise destroy the seeds of weeds, which are generally in dung, and hurt the wheat when they shoot up."

Various methods of improving poor arable land, have been suggested by different writers. But as we consider old DUHAMEL's plan of ploughing, and then pulverizing the soil properly by the harrow, the most effectual, where sufficient manure cannot be procured, we shall only relate two suggestions which deserve notice, chiefly on account of their originality. JOHN MORDANT, in his "Complete Steward," published in 1761, advises a method of improving poor, *worn-out* land, as he terms it; which, not being an expensive one, may well deserve a trial: "A pound of turnip-seed sown, after harvest, upon an acre of light, sandy, or gravelly land, that is poor or worn out by over-ploughing, and where manure is wanting (the crop of which being ploughed in, when grown high), will, in two months' time, die away and rot, and enrich the land, so as to prove as good a manuring as twenty loads of dung, or more, upon an acre."—P. 457.

Another, and equally eccentric, manner of recruiting worn-out land, is that proposed by Mr. RANDALL, in his "Semi-Virgilian Husbandry," which appeared in 1764. We likewise communicate it in the author's own words: "The loam, immediately after harvest, is to be turned up; and as we shall suppose it will allow the ploughman to go very deep, this is a point to be obtained at any rate, for a worn-out soil. In order to effect this, one plough is to go the usual depth, and another plough to follow at the same depth, and in the same furrow, which will throw the mould over it, and bury the stubble. In this case the field will lie under the advantage of being turned upside-down, as if it were double spitted, more than a foot deep, and the stubble will be sooner rotted. When this is done, the harrows must make the ground as fine as the bad condition of it, or the season, will permit."—P. 12.

We shall conclude this article with an useful hint, given by Mr. R. PRICE, of Knelworth, Herts, to the Society for the Encouragement of Arts, Manufactures, and Commerce; respecting the damage done to arable land, by carrying off the *small stones* and flints from the surface, for the purpose of making turnpike-roads. This practice is highly detrimental to almost every kind of ploughed land, but particularly to what are called thin-stapled, or light soils. Mr. PRICE justly observes, that "stones are of surprizing and manifold uses: for instance, they greatly assist the plough in working the land; they also prevent land of a binding quality from running together, and hardening, like mortar in a wall; they screen the tender blade from blasts and blights; they not only prevent the crop, where the staple is thin, from being scorched up in summer, but also the exudations of the earth from evaporating; and by that means greatly promote vegetation."

It is almost superfluous to add, that this reasoning is equally applicable to fields and gardens.—See also the articles HUSBANDRY, LANDS, SOIL, and TILLAGE.

Arachis hypogæa. See EARTH or GROUND-NUT, and CHOCOLATE.

Aranea. See SPIDER, and BAROMETER.

ARBOUR, in gardening, is a kind of shady bower, formerly in great esteem, but of late almost generally abandoned, on account of the damp and unwholesome shelter it affords.

Arbours are principally constructed of lattice-work, of wood or iron, and are frequently covered with elms, limes, and horn-beams, or with creepers, such as honeysuckles, jasmines, and passion-flowers; either of which will answer the desired purpose; though we by no means wish to countenance their re-introduction.

Arbutus. See STRAWBERRY-TREE.

ARCANUM, strictly speaking, signifies any thing which is involved in mystery; but, in physic, it more usually denotes a remedy, the preparation of which is industriously concealed, either to enhance its value, or increase its reputation among the vulgar.—See NOSTRUM, and SPECIFICS.

Archangel, Yellow. See WEASEL-SNOUT.

ARCHERY is the art, or exercise, of shooting with a bow and arrow.

Among ancient nations, the bow was the principal instrument of war; and the skill of the archer often decided the fate of battles and of empires.

The English were particularly expert in the use of this instrument; and their ever memorable victories at the battles of Cressy and Poictiers, were chiefly ascribed to their valiant archers.

JAMES the First of Scotland, who had seen and admired the dexterity of English archers, and was himself a skilful bowman, endeavoured to revive that exercise among his own subjects, by whom it had been neglected; but the untimely death of that excellent prince, prevented the effectual execution of this useful project.

In the time of EDWARD the Third, there was an act of parliament, which obliged our English archers, even in times of peace, to erect butts in every parish, and to shoot on Sundays and holidays. By this constant practice, the English armies possessed an exclusive advantage over their enemies.

CHARLES the First of England, from a treatise entitled "the Bowman's Glory," also appears to have been an archer. In the eighth year of his reign, he issued a commission to the Chancellor, Lord Mayor and Privy Council, to prevent the fields near London from being so inslosed, as "to interrupt the necessary and profitable exercise of shooting."

The use of the long-bow continued in estimation for more than two centuries after the introduction of gunpowder; which was probably owing to the weight and unwieldiness of muskets.

The distance to which an arrow may be shot from a long-bow, depends in a great degree on the strength and size of the archer, but in general is reckoned from eleven to twelve score yards.

Archers consider an arrow of from twenty to twenty-four drop weight, to be the best for flight, or hitting a mark at a considerable distance; and yew, the best material of which they can be made. The feathers of a goose are generally preferred; two out of three are commonly white, being taken from the gander; the third is brown or grey; and this difference of colour informs the archer when the arrow is properly placed. The long-bow is of the same height as the archer himself: and in England a peculiar method is practised, by drawing the arrow to the ear, and not towards the breast; which is doubtless more advantageous than that adopted among other nations.

The force with which an arrow strikes an object, at a moderate distance, may be conceived, from the account given by King Edward VI. in his Journal, where he says, that one hundred archers of his guard, discharged in his presence two arrows each; that they shot at an inch-board, and many of them pierced it quite through, though the timber was well seasoned.

It may perhaps be a subject worthy the consideration of government, whether the revival of archery, by uniting military discipline with manly exercise, might not become an additional means, both of preserving health, and protecting us against foreign enemies. According to Neade, an archer might shoot six arrows in the time of charging and discharging a musket; and an ounce of fire-work may also be discharged, upon an arrow, to the distance of 240 yards.

The earliest histories of archery, in England, are those by Ascham, who wrote his *Toxophilus* in the reign of Henry VIII.; Markham's *Art of Archery*, which appeared in 1634; and Wood's *Bowman's Glory*, in 1682: but the latest, and most complete work on the subject, is "*An Essay on Archery*," describing the practice of that art, in all ages and nations; by W. M. Moseley, Esq. 8vo. pp. 348. 7s. boards. Robson, 1792. In this classical treatise, the author considers bows, arrows, quivers, butts, targets, and cross-bows, under different heads; and his account is illustrated by plates. Ease and perspicuity; richness without verbosity; and elegance untainted with affectation, are the characters of this entertaining work.

Archery continues to be practised by the inhabitants of Geneva, and in many parts of Flanders. In Britain we have several societies of archers, the principal of which are the Woodmen of Arden, the Toxopholite, and the Royal Company of Archers of Scotland.—See also, Arrow.

ARCHITECTURE, a term which denotes the art of building in general, though chiefly applied to the construction of edifices appropriated to the purposes of civil life, such as houses, churches, halls, bridges, &c. &c.

The origin of this art is involved in obscurity. It is generally supposed, that the earliest materials employed in building, were branches and twigs of trees, with which the primitive inhabitants of the earth constructed their huts, similar to the present wigwams of the Indians. This conjecture, however, appears doubtful, for the natural shelter afforded by caverns in the sides of mountains, or rocks, would more readily suggest the idea of using stones and earth, as materials for building houses. That the preference was given to stone buildings, over any kind of temporary huts, or tents, is obvious from the practice among the inhabitants of America, where the human race existed in its rudest state; these people were no sooner collected into great bodies, under the Emperors of Mexico and Peru, than stone buildings were immediately attempted. Hence the origin of architecture should not be searched for in any single nation, but in every country, at a time when the natives began to relinquish their savage way of life, and to adopt civilized manners.

The origin of all regular buildings, however, hath, by several authors, been generally, and very plausibly, deduced from the construction of the meanest huts. These were, at first, probably made of a conic figure, which is the simplest in structure, but being inconvenient on account of its inclined sides, both the figure and construction of the huts were changed, by giving them a cubical form.

At length, mankind insensibly improved in the art of building, and invented methods of rendering their habitations durable and handsome, as well as convenient. They deprived the trunks of trees of their bark, and other inequalities of surface, raised them above the wet, or humid soil, by means of stones, and also covered each with a flat stone, or slate, to exclude the rain. The interstices between the ends of the joists, were closed with wax, clay, or similar substances: the position of the roof was likewise altered; and, as on account of its level surface, it was unfit to carry off the abundant rain-water, they elevated it in the middle, by placing rafters on the joists, to support the earth and other materials of the covering. From this simple construction, the orders of architecture undoubtedly took their origin; for, when the rude builder began to erect stately edifices of stone, he imitated those parts which, from necessity, had composed the primitive huts. Thus, the upright trees, with stones at each end, were the origin of columns, bases, and capitals; and the beams, joists, rafters, &c. which formed the covering, gave rise to architraves, frizes, trigliphs, cornices, &c.

Although the first buildings were rough and uncouth, because the artificers of those remote ages possessed neither skill, experience, nor tools, yet, when by length of practice, certain rules had been established, and many new instruments invented, the art rapidly advanced towards perfection: a variety of style, or different methods of building, were discovered, which, by succeeding generations, have been held in the greatest esteem.

The Egyptians, from the earliest ages of antiquity, have been considered as the inventors of arts; and, among other contrivances, may be numbered that species of original architecture, in which the strength of the fabric was more regarded than either its elegance, or symmetry.

We cannot, consistently with the plan of this work, enter into a detail of the rise and progress of architecture; and shall, therefore, only observe, that the Greeks, whose sublime and penetrating genius prompted them to combine elegance with convenience, derived their first ideas of building from the Egyptians.

But the mind of man being unquestionably influenced by the mode of government under which he lives; and the Greeks, with their independence, having also lost their ascendancy in works of genius, from that period the Romans must be considered as the encouragers of this noble art.

The *orders*, as now executed by architects, are five, viz. 1. the *Tuscan*; 2. the *Doric*; 3. the *Ionic*; 4. the *Corinthian*; and 5. the *Composite*. The first, from its robust appearance, is used in works where strength and simplicity are the essential requisites; the second is nearly similar to the Tuscan in strength, but is enlivened by its peculiar ornaments; the third is more delicate than either of the former; but the fourth displays more beauty and ornament than the others, and is therefore frequently used for the internal decorations of stately rooms; the fifth order is nearly the same as the Corinthian.

The style of building, as practised throughout Europe in the early ages, was denominated *Gothic, Saxon, Norman*, and *Saracenic*. But what we commonly call *Saxon*, is in reality Roman *architecture*.

When the Romans invaded the Britons, they found no places corresponding to our ideas of a city, or town, consisting of a great number of contiguous houses, regular streets, lanes, &c. Dwellings, like those of the ancient Germans, were scattered over the country, and generally situated on the brink of a rivulet, for the sake of water, or on the skirt of a wood or forest, for the purpose of hunting, and providing pasturage for their cattle. These inviting circumstances, being more conspicuous in some parts of the country than in others, the princes and chiefs selected the most agreeable spots for their residence. Thus arose an ancient British town, so characteristically described by CÆSAR and STRABO, as "a tract of woody country, surrounded by a mound and ditch," for the security of its inhabitants against the incursions of their enemies.

As soon as the Romans began to form settlements and colonies in this island, a sudden and remarkable change took place in the style of architecture. For that wonderful, brave, and industrious people, speedily adorned every country which they conquered. They not only built a considerable number of solid, convenient, and magnificent edifices for their own accommodation, but also exhorted and instructed the Britons to follow their example. In short, this eminently useful art, was one of the principal means employed by AGRICOLA, to civilize the Britons, and reconcile them to the Roman yoke.

Not long after this period, however, architecture, and the arts connected with it, began sensibly to decline in Britain; partly in consequence of the building of Constantinople, which attracted the most famous architects to the East. But the almost total ruin and neglect of architecture in this island, may doubtless be attributed to the final departure of the Romans. For the natives, and the descendants of Roman and British parents, having neither skill nor courage to defend their numerous towns, forts and cities, suffered them to be plundered and destroyed by their ferocious invaders, the Scots, Picts, and Saxons: the last mentioned, in particular, having no taste for the arts, committed the most wanton and extensive devastations.

In the 12th century, architecture again revived, and experienced very great improvements, in consequence of the religious zeal of the clergy; and, in the 15th and 16th centuries, the chaste style of the Greeks and Romans was again displayed in Britain. For, though the Italians for a long time maintained their superiority, in this as well as in other arts, over all the European nations, yet as men of genius from distant parts constantly resorted to Italy for the purpose of improvement, since that period architects have arisen in our own country, equal to any that ever appeared on the classical ground of Italy.

The latest and most splendid publication on this subject, which is intended as a Supplement to that magnificent work, '*Vitruvius Britannicus*,' and which contains the studies of the most celebrated artists of the present day, is the following: "*A Collection of Plans and Elevations of modern Buildings*; public and private, erected in Great Britain, &c." It is engraved in aquatinta, from original drawings by G.R. Richardson, architect. Seven numbers, at 10s. 6d. each, are already published, and the whole is to be completed in ten such numbers.

Another very useful work has lately appeared, under the title, "*Hints for Dwellings*, &c." By D. Laing, architect and surveyor, 4to. 34 plates, 1l. 5s. Taylor, 1800. It consists of original designs for cottages, farm-houses, villas, &c. plain and ornamental: with plans to each, uniting convenience and elegance with economy. The Monthly Reviewers say: "We recommend the present work, as one of the best of that kind, to the attention of those who wish to amuse themselves with brick and mortar."

Besides these, we shall mention the following architectural works, which reflect credit on the artists of this country: "*The Rudiments of Ancient Architecture*, &c." royal 8vo. edit. 2d. price 6s. boards, published for Taylor, in 1794.—"*Sketches in Architecture*;" by J. Soane, architect, &c. 54 folio plates, 2l. 12s. 6d. half bound, 1793.—"*A Treatise on the decorative part of Civil Architecture*;" by Sir Wm. Chambers, &c. edit. 3d. Imperial folio, price 3l. 3s. Cadell, 1791.

Architecture, being an useful and elegant art, is carried on in three different ways: first, for utility; secondly, for ornament; and, thirdly, for the construction of such buildings as require the combined effects of both.

Edifices intended solely for utility, should in every part correspond with the design: hence any material deviation from that principle, for the sake of ornament, ought to be strictly avoided.

Works erected with this intention, are to be considered as a mean conducive to some end; and the nearer they approach to the object in view, the more will such structures gain the approbation of competent judges, though every graceful decoration may have been neglected.

Buildings of such a nature only, are compatible with our plan, and of these we shall give a more particular account under the article Building.

Arctium. See Burdock.

Areca. See Faselnut, Catechu, and Cabbage-Palm.

Arenaria. See Sandwort.

Argemone. See Prickly Poppy.

ARGUMENT, when applied to

logic, signifies an inference drawn from premises, the truth of which is either indisputable, or highly probable. In matters of literature, it denotes the abridgement, or heads, of a book, history, chapter, &c. Considered in the former sense, in which it solely relates to reason, and to the investigation of truth, it is, in its principles, of a simple and homogeneous nature; and requires no particular explanation. For, pleasure being the chief end of poetry, and persuasion that of eloquence, the real constitution of things is often perverted, or disguised, and compelled to adapt itself to the imagination and the passions; but *truth*, being the ultimate object of *argument*, stands in need of no dazzling colours, or the figurative language of rhetoric.

It is not, however, unusual (both in private life and in the senate) to draw from an argument, a conclusion very different from what it really implies. Cunning and bold disputants frequently avail themselves of ambiguous expressions, which easily engender a confusion of ideas; and thus the fallacy of their incongruous reasoning but too often escapes detection, as it remains involved in sophistical perplexity.—For a farther consideration of this interesting subject, we refer our readers to the article of LOGIC, where it will be more applicable than under the present.

Aristolochia. See BIRTHWORT.

ARITHMETIC, is a science which teaches the method of computing numbers, and explains their nature and peculiarities. At what time it was invented, is altogether unknown; though the four first fundamental principles, viz. addition, subtraction, multiplication, and division, have always, in a certain degree, been practised by different nations.

The Greeks were among the first who brought arithmetic to perfection; and they are supposed to have originally made use of pebbles in their calculations. The most complete method of numbering now used in this country, was introduced into Europe by the Arabians, when they were in possession of Spain. These people, however, acknowledged that they derived their information from the Indians. How the latter became acquainted with it, we are entirely ignorant. The earliest treatises extant upon the theory of arithmetic, are, the 7th, 8th, and 9th books of EUCLID's *Elements*, in which he treats of proportion; of prime and composite numbers. NICOMACHUS, the Pythagorean, also wrote concerning the distinctions and divisions of numbers into classes, as plain, solid, triangular, &c.; in which he explained some of the leading peculiarities of the several kinds.

As learning advanced in Europe, the knowledge of numbers also increased, and the writers on this subject soon became numerous. RAMUS was the first who, in his *Treatise on Arithmetic*, published in 1586, used decimal periods, for reducing the square and cube roots to fractions; but the greatest improvement which the art of computation ever received, was from the invention of *logarithms*, the honour of which is due to JOHN NAPIER, Baron of Merchiston, in Scotland, who published his discovery about the beginning of the 17th century.

Arithmetic may now be considered as having advanced to a degree of perfection which, in former times, could scarcely have been conceived, and to be one of those few sciences which have left little room for farther improvement. It is, however, a serious and almost general complaint, that few children, while at school, make any tolerable progress in arithmetic; and that the generality, after having spent several years under the tuition of a master, are incapable of applying the few rules which they may have learned, to the useful purposes of life. A little reflection will suffice to convince us, that not much benefit is to be derived from the usual mode of instruction. A few elementary principles are acquired by *rote,* and therefore quickly forgotten; because the most essential particulars, viz. the reasons on which these rules are founded, and their extensive use in the various concerns of society, are generally omitted. Teachers, as well as writers, cannot be wholly exempted from the charge of having, in some degree, contributed to this evil; for, by stating the rules without their corresponding reasons, they act upon mechanical principles, and thus encourage the idea, that demonstrations in every instance are useless, and in some, impossible.

Every young arithmetician should remember, that before he forms any particular question or numerical proposition, it is absolutely necessary to consider whether the terms be directly proportionate to each other; for otherwise he will be liable to commit gross errors. Although in buying and selling, the *price* increases or decreases in the same relative proportion as the *quantity* of goods, yet in geometry, natural philosophy, &c. those things which at first sight appear to be in simple proportion to each other, may, on a mature investigation, prove the contrary. Previously, therefore, to the solution of questions respecting these sciences, he should be made acquainted with those elementary principles on which they are founded.

Another material error committed in the inferior schools, is the admission of boys under the age of ten or twelve, often for the sake of *early* fees, though they are incapable of being instructed by reasoning with them. Hence we are decidedly of opinion, that this is one of the *negative,* modern improvements; and that the earliest period of fixing the attention of youth on scientific objects, is, according to their individual capacities, from the twelfth to the fifteenth year of their age.

Among the latest, and most instructive works on this subject, we enumerate the following:—"*An Introduction to Arithmetic and Algebra*;" by T. MANNING, two volumes, 8vo. 10s. boards. Rivingtons, 1798.—"*Arithmetical Questions, on a New Plan*; by W. BUTLER, 8vo. edit. 2d. 4s. boards. Dilly, 1797.—"*The Arithmetician's Guide*;" by W. TAYLOR, 12mo. 2s. 6d. bound. Baldwin, 1788.

See also, EDUCATION and BLINDNESS.

Arnica montana, L.—See GERMAN LEOPARD'S BANE.

AROMATIC, an epithet given to such substances as yield a strong fragrant smell, and impart a warm taste. In this class are included the various spices, such as nutmegs, cloves, cinnamon, mace, &c. Some of them have a sweetness mixed with their aromatic principle; such as the angelica root, anise seed, and fennel; some are astringent, as cinnamon; others afford a strong mucilage, as the *Cassia lignea*; and again, others a bitterness, as orange and lemon peel.

The aromatic ingredient is extracted in different proportions from various substances, by rectified spirits of wine; though it is sometimes obtained by mere infusion with water.

Aromatics form an useful and agreeable ingredient in many articles of cookery, but especially in dishes prepared of watery and flatulent vegetables, of which they are the best correctors: they warm the stomach, and stimulate the whole system; raise the pulse, and quicken the circulation. In cold, languid habits, and a relaxed state of the solids, they support the animal spirits, or increase vital action, and promote the salutary secretions: but to hot, bilious temperaments, full habits, and inflammatory dispositions, they are certainly pernicious.

ARQUEBUSADE WATER, a medicinal preparation, which has received this name, from its great efficacy in healing gun-shot wounds, though it is, at present, with more propriety, applied to bruises, tumors arising from blows, and particularly to suggillated parts containing coagulated blood.

Various mixtures are used for this purpose, but according to our experience, the following deserves the preference, both on account of the easy manner of preparing it, and its superior virtues: "Take distilled vinegar and rectified spirit of wine, of each one pound and a half, double refined loaf-sugar, half a pound, and five ounces of common oil of vitriol. This composition may be applied to the injured parts in a cold or lukewarm state; and the compresses should be kept continually moist, for as soon as they become dry, the pain is liable to return. By its astringent property it contracts the skin; and the sugar which settles on it, not unlike a coating of glue, ought to be carefully washed off every other, or third day, with Goulard-water. No other remedy is equal to this, if it be properly and timely applied; but we think it necessary to add, that care must be taken, not to sprinkle or shed any of the mixture on clothes or linen, which would be burnt and destroyed by its causticity.—See BRUISES.

ARRACK, Arac, or Rack, is a spirituous liquor obtained from the East Indies, and used either as a cordial, or an ingredient in punch. It is obtained by distillation from rice, or sugar, fermented with the juice of cocoa-nuts. Goa and Batavia are the chief places from which arrack is exported. At the former, there are three sorts, viz. the single, double, and treble distilled. The double is but a weak spirit, in comparison with that obtained at the latter place; but, on account of its peculiar flavour, it is preferred to all the others.

The arrack now in general use contains but a sixth, and sometimes only an eighth part of alcohol, or pure spirit. A spirituous liquor of this name is also extracted by the Tartars of Tungusia, from mare's milk, which is first suffered to turn sour, and then distilled two or three times, between two close earthen pots, from which it runs through a small wooden pipe. It is possessed of the most intoxicating qualities; so that, according to Prof. PALLAS, men, women, and children, frequently drink themselves into a semi-delirious trance, which continues for forty-eight hours.

Various penalties are attached to the sale of arrack, without conforming to the usual duties and regulations established by several acts of parliament, with which we shall not trouble our readers, but refer them to the statutes made concerning this article.

Genuine arrack is said to possess balsamic, softening, and restorative properties, and to be less liable to produce the usual inconveniences of other spirits. It is farther supposed to contain a fine subtile oil, so minute as to incorporate readily with water: hence it is generally preferred in those cases, where repeated debauches have abraded the internal sides of the vessels. Persons who are unfortunately addicted to the use of ardent spirits, as well as those troubled with the gout or rheumatism, and who cannot comply with the rules of sobriety and temperance, *may* use arrack in preference to Hollands, or brandy. On account of its strong empyreumatic oil, however, it is difficult of digestion, soon turns rancid; causes numerous obstructions, and is consequently injurious to individuals of lax solids, and thick or sizy fluids. Happy, therefore, are those who can entirely banish spirituous liquors from their tables; as, from their stimulating and pernicious qualities, they have destroyed incalculable numbers of human beings—perhaps exceeding in the aggregate, all the victims that ever fell under the combined scourges of war, hunger, and pestilence.

ARRANGEMENT, a term which denotes a distribution of the various component parts of any whole, in a certain order, or proportion; and refers either to substance, time, or place. In the first instance, we may say, that the diversity observable in various colours is owing to a peculiar arrangement of those parts which reflect the light; in the second, that regularity and order in human transactions are the result of a methodical distribution, or arrangement of time; and to explain the last, it may be said, that the different genera and species of plants and flowers are, by botanists, arranged under their respective classes, and in their proper places.

A happy arrangement of ideas, words, and sentences, forms one of the principal beauties of a speech, or dissertation. The reverse implies confusion, which is frequently glossed over by a torrent of ambiguous and flowery expressions, so that it requires no small degree of critical acumen, to distinguish the philosophical speaker from the verbose orator.—See ARGUMENT.

ARROW, is a missive weapon of defence, used by archers. Its form is slender, pointed, and barbed.—Arrow-makers were denominated *fletchers*; men of considerable importance in the state.

Arrow-heads and quarrels were required to be well boched or brased, and hardened at the points with steel; the finishing of which appears to have been the business of the arrow-smith. A more particular account of bows and arrows will be found under the title of ARCHERY.

ARROW-GRASS, is a plant of which there are three species; but two only are natives of Britain, namely, the *Triglochin palustre*, or Marsh, and the *maritimum*, or Sea Arrow-grass. The former is frequently met with in marshy grounds, and the latter near the sea coast, and in saline tracts. As they are eaten with avidity by sheep, for which they serve as an excellent and wholesome food, we presume strongly to recommend their culture. An additional motive for the propagation of the arrow-grass, may be suggested to the farmer and breeder of sheep; because it thrives extremely well in moist and swampy places, where few other vegetables would grow.

ARROW-HEAD, COMMON, the *Sagittaria sagittifolia*, L. is one of those neglected plants, which, though growing wild in many parts of England, especially on the banks of rivers, are not converted to any useful purpose: it is represented in Pl. 7. *English Botany*, p. 84.

The root of the arrow-head is composed of numerous strong fibres, which strike into the mud; the foot stalks of the leaves are of a length proportionate to the depth of the water in which they grow; they are thick, fungous, and sometimes three feet high. Its sharp pointed leaves resemble the point of an arrow, and float upon the water. At the lower extremity of the root, there is always, even in its wild state, a bulb which grows in the solid clay, beneath the muddy stratum.

This *esculent* root is industriously cultivated in China and America, where it attains to the size of several inches in diameter; while, in this country, of which it is a *native*, we suffer it to undergo spontaneous dissolution. As it constitutes a considerable part of the Chinese diet, no reason can be alleged, why it should not be resorted to in times of scarcity, when a poor cottager, in some parts of the country, might in one day, with his family, collect a sufficient quantity of these nourishing and palatable roots, to serve them for a fortnight, as excellent substitutes for bread. With respect to the manner of dressing and preparing such vegetables, we shall give the necessary directions under the article bread.

The arrow-head requires a low, cold, marshy situation, and a clayey soil, where scarcely any other plant would thrive. Here it grows luxuriantly, and produces an oblong, thick, bulbous root, which, from its *mealy* nature, may be easily converted into starch, or flour. Even in its raw and unprepared state, it affords a proper and wholesome food for horses, goats, and hogs; though cows do not relish it. There are two methods of propagating this beneficial plant; either by the wild-growing fibres of the root, or by the seed; and we earnestly recommend its culture, from a conviction of its great utility. In the present alarming crisis, we also venture to suggest the propriety and expediency of *inducing* the industrious poor to collect this and similar plentiful roots, and after washing, macerating them, and expressing their starch, to mix it with other ingredients, in the making of bread. If persuasion and reasoning do not avail, small premiums or rewards might be offered, to accomplish so desirable a purpose.

ARROW-ROOT, Indian, or the *Maranta*, a plant of which there are three species, the *arundinacea*, *galanga*, and *comosa*; all of them are herbaceous, perennial exotics of the Indies, and kept in our hot-houses merely for curiosity. The first of these species is the true *starch-plant*, and is likewise used by the Indians to extract the poison communicated by their arrows.

Dr. WRIGHT, of Jamaica, appears to be the first who informed us that a decoction of the fresh roots make an excellent ptisan in acute diseases. From an ingenious pamphlet published in 1796, by Mr. T. RYDER, of Oxford-street, we farther learn, that one of his West Indian patients employed it as an article of diet, and since that period it has been very generally used in families.

The arrow-root powder unquestionably yields a larger proportion of nutritive mucilage than any European vegetable, if we except the *Salep-root*: hence a single tablespoonful of either, makes a pint of strong and nourishing jelly, which affords a very proper food in acute diseases, as well as in all those complaints where animal food must be abstained from. It is therefore to be regretted, that we cannot easily obtain this powder in a pure state, without paying the extravagant price of from five to ten shillings per pound; for in those shops where it is offered to sale at an inferior price of two or three shillings the pound, we have found by experience, that it is considerably adulterated.

Mr. RYDER, before mentioned, has justly recommended the culture of this root to the West Indian Planters, and the new African Colonists, as an object of commerce, and the most eligible substitute for starch made of wheat: 1. Because it would save annually 66,000 quarters of that valuable grain, in Great Britain alone, where the average quantum of starch made in the years 1793, 1794, and 1795, amounted to 8 millions of pounds weight, allowing one hundred and twenty pounds per quarter;—2. As the wholesale price of the arrow-root was, in 1796, fifteen pence a pound, and as one pound of its starch is equal to two pound and a half prepared from wheat, its intrinsic value would, by this computation, not exceed *six*-pence per pound: whereas the average price of starch in England for seven years from 1789 to 1795) may be stated at *nine*-pence the pound.—3. As the arrow-root contains more soluble, gelatinous matter, occupying less space, being less enveloped in earthy particles, and affording a purer farina than any other plant, it may be reasonably inferred, that the starch obtained from it must be of the finest quality; an opinion amply confirmed by three clear-starchers, who were, on this occasion, consulted by the Society for the Encouragement of Arts, Manufactures, and Commerce.

ARSENIC, an heavy, opaque, crystalline substance, which, on fracture, resembles sal ammoniac in a concrete state. Most of the metallic ores contain it in greater or less proportion, especially those of copper, tin, bismuth, and the fossil called *cobalt*, from which last it is extracted in Saxony, by a kind of sublimation. Its true nature is so little known, that chemists have hesitated whether it ought to be ranked among the salts, or semi-metals; because it may, by various processes, be made to assume either a saline or metallic state. Hence, it has by many been considered as a mineralizing substance, which only tends to combine metals, and to give them a more perfect form. Nay, there are others, who have doubted whether it be a simple body; and we well remember the assertion of an ingenious lecturer on chemistry and pharmacy in Edinburgh, who still flatters himself with the hope of being able, at some future period, to demonstrate by experiment, " that arsenic is the true basis of silver."

This semi-metallic concrete is very usefully employed in various branches of the arts and manufactures; it is frequently added as an ingredient, to facilitate the fusion of glass, and to produce a certain degree of opacity. Painters use two arsenical preparations, namely, the orpiment and realgar. A very beautiful green pigment may be precipitated from blue vitriol, by a watery solution of white arsenic and vegetable alkali: this, when prepared either with water or oil, affords a permanent colour. It is highly probable that, if arsenic were added to the paint used for wood, it might form an ingredient which would not be liable to be preyed upon by worms. But the practice of painting the toys of children with arsenical pigments, deserves severe censure; as they are accustomed to put every thing into their mouth.

In dyeing, it is likewise of great service. Combined with sulphur, it has the property of readily dissolving indigo; for which purpose it is used in the printing of calico, and other cloth. On exposure to the air, however, the arsenic is precipitated from this solution, and may be farther employed in pencil colours. Some dyers are said to understand the art of imparting beautiful shades of colours to furs, by arsenical solutions.

In rural and domestic economy, this concrete is also frequently resorted to with great advantage, though not always with due precaution. Farmers dissolve it in lime-water, for steeping wheat, in order to prevent the smut; and it is likewise asserted, that the husbandmen of Flanders and Germany use it for fertilizing the earth, by sprinkling the soil with a solution of arsenic in dung-water.

In medicine, it has long been known as the basis of the most celebrated *cancer-powders*, especially those of PLUNKET, Dr. HUGH MARTIN, and probably also, of GUY'S. A weak solution of it in water, is directed by Dr. WAY, of Wilmington, for effectually cleansing foul ulcers, and removing impurities of the skin: it is prepared by boiling one ounce of white arsenic in two quarts of water to three pints, and applying it once or twice a day. When it is used for extracting, or discussing, cancerous or schirrous tumors, that are not ulcerated, the above-mentioned Dr. MARTIN, a late physician in America, previously ordered a blister of Spanish flies to be applied to the part, with a view to open the pores of the skin. But, as he prescribed it empirically, and indiscriminately in *all* cancerous cases, we were not surprized to learn from his old professor, Dr. BENJ. RUSH, one of the most candid and enlightened American practitioners, that his pupil has often been unsuccessful in the application of his arsenicated powders *.

In the cure of *agues*, a solution of this mineral has been strongly recommended, and administered with success, upon the authority of Drs. Fowler, Arnold, Withering, Willan, Marsh, Pearson, and many other respectable English and foreign practitioners, who do not hesitate to prescribe it in doses, from two to twelve drops, once, twice, or oftener in the course of the day, according to the age, strength, and other circumstances of the patient.

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* It is presumed, that the liquid medicines, now *secretly* exhibited by a physician in the metropolis, who positively maintains *that he cures cancers* "by absorption," likewise consist

A preparation similar to that directed by Dr. Fowler, and called the white tasteless *ague-drop*, has lately been given with singular efficacy in the hooping-cough. We relate this fact upon the evidence of Mr. Corp, an eminent surgeon, of Barnet.

Notwithstanding these remarkable and powerful effects of arsenic over the virulence of diseases, which appear to depend either on a specific contagious miasma, such as is supposed to produce the ague and hooping-cough, or on a peculiar disposition of the fluids and solids, to undergo a certain degree of decomposition in the living body, as is evident in cancers, and other malignant ulcers,—we are, on the combined testimony of many medical practitioners, equally celebrated for their extensive practice and erudition, as they are conspicuous for their professional zeal and integrity, irresistibly induced to declare our opinion, at least, against the *internal* use of this active and dangerous medicine. Of the numerous authorities which might be adduced in support of this declaration, we shall here avail ourselves only of the conclusive testimony of Dr. Black, the late professor of chemistry in the university of Edinburgh, who maintains, that he has seen the internal exhibition of arsenic attended with fatal effects, such as hectics, &c.; nay, he declares, that though the external application of this substance has, in *some* cases, proved successful, it has often, even in this way, produced dreadful consequences; so that, far from recommending it internally, he reprobates even the external use of this precarious drug. Hence we hope to be forgiven by those worthy medical practitioners, from whom no slight motives would induce us to differ: and unless it could be proved by a *plurality* of cases, that patients, after the taking of arsenic to some extent, have not only recovered from agues, cancers, hooping-cough, &c. but that they have likewise attained to a considerable age, without ever having been subject to paralytic, spasmodic, or phthisical disorders, we shall not be disposed to retract our opinion of its virulent and destructive tendency.

Although we have deprecated the *internal* use of arsenic, both from the concurrent evidence of many other practitioners, and our own experience, yet we shall attempt to prove, that there is actually less danger to be apprehended from those accidents, when this corrosive poison has, by mistake, been swallowed, either in the form of a powder, or solution. And as it is frequently used for destroying rats, mice, and other troublesome animals; for preparing sympathetic inks *, as well as for chemical tests; to discover the adulterations

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sist of solutions made of this virulent semi-metal. We trust, however, that previous to the publication of the third or fourth Number of our Work, we shall, by an accurate chemical analysis, be enabled to ascertain the truth or falsity of that assertion.—See Cancer.

* See the article Sympathetic Ink,

of wines *, which have been sweetened by sugar of lead; we cannot be too minute in laying down proper rules and directions for obviating the dangerous effects of such casualties, as but too often occur among those who employ arsenical preparations, in a dry or liquid state, either for gratifying their curiosity by different experiments, or for other more useful purposes.

Arsenic is one of the most sudden and violent poisons we are acquainted with. Its fumes are so deleterious to the lungs, that the artist ought to be on his guard, to prevent their inhalation by the mouth; for if they be mixed and swallowed with the saliva, effects will take place similar to those, which follow its introduction into the stomach in a saline or dissolved state; namely, a sensation of a piercing, gnawing, and burning kind, accompanied with an acute pain in the stomach and intestines, which last are violently contorted; convulsive vomitting; insatiable thirst, from the parched and rough state of the tongue and throat; hiccough, palpitation of the heart, and a deadly oppression of the whole breast succeed next; the matters ejected by the mouth, as well as the stools, exhibit a black, fetid and putrid appearance; at length, with the mortification of the bowels, the pain subsides, and the fatal catastrophe terminates the sufferings of the patient. There are, however, cases on medical record, in which, on dissection, neither the stomach nor bowels, according to the testimonies of Drs. **Metzger** and **Hahnemann**, have been corroded, nor even injured; so that this poison may, in some instances, exert its action immediately on the living principle. Thus we find, in a case related by our late friend, Dr. **Unzer**, of Hamburgh, that a lady, who had only tasted a little arsenic, without swallowing a particle, was twelve hours after the accident thrown into the most convulsive spasms, and attacked with inflammatory pustules, not unlike the measles, covering her face, neck, and whole body, so that she recovered with great difficulty, and remained for several years in a miserable state of languor and general debility.

For these obvious reasons, artists exposed to the fumes or vapour of this volatile mineral, ought to be extremely cautious to preserve themselves from its influence on their mouth and nostrils, as well as from touching it with their hands; for every external contact may be attended with serious consequences. Hence they should dress in thick and firm clothes, keep at a proper distance from the exhaling fumes, and cover the orifices of the face with a mask, made for the purpose. In their system of diet, we advise them to make use of a great proportion of bland and mucilaginous nourishment; such as fresh butter, pork, sweet oil, milk, artichokes, and similar vegetables.

With respect to the treatment of persons, after the inhalation, or swallowing of arsenic, we shall arrange the subject under three distinct propositions.

I. *When a large portion of arsenic has been introduced into the stomach, or inhaled by the lungs:*

1. *Immediately after the accident*, brisk emetics; for instance, half a dram of white vitriol, and,

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* See Wine.

after it plenty of sweet lintseed, or almond-oil, either of which is preferable to olive-oil; or, if these be not at hand, large draughts of milk, barley gruel, or warmed beer, with a third part of oil, or butter, ought to be substituted, as soon as possible. To facilitate the operation, a strong feather should be dipt in oil, for stimulating the tonsils. If the throat be swollen and contracted, a surgeon ought to be instantly procured, for opening the gullet by means of a probe, or other proper instruments.

2. To neutralize and deprive this corrosive poison of its activity, according to Dr. Hahnemann, nothing is more efficacious than a solution of white soap in hot water, in the proportion of half a pound of the former to a quart of the latter, which must be boiled, and the soap agitated, till the whole is dissolved; when it may be sweetened with sugar. This preparation ought to be taken without delay, and so frequently as to repeat half a tea-cup full of it every five minutes, that the patient may swallow several pounds in the course of two hours. If hepatised water (prepared by pouring acids on the liver of sulphur, and saturating, with the ascending vapours, water contained in another vessel), could be readily procured, it would, with the addition of one half of thick cream, be an excellent substitute for the solution of soap.

3. To promote the evacuation of the poison by stool, clysters composed of the preceding liquids, and a third part of castor-oil, ought to be speedily administered, and the whole abdomen fomented with soap-water.

4. With a view to prevent local or general inflammation, beside the fomentations, cataplasms, lukewarm baths and clysters, it will, perhaps, be necessary to bleed the patient largely, but not without consulting medical men.

II. *When a person has been slowly poisoned, or has swallowed only a small portion of arsenic; or, if the proper remedies should have been neglected for several hours.*

In these cases, the judicious practitioner only can decide upon the relative propriety and expediency of the preceding remedies; but if a considerable time has elapsed since the accident happened, it will be necessary to commence the treatment with purgative remedies, such as will at the same time lubricate the coats of the stomach, and the whole intestinal canal, while they tend to assuage the acrimony, and counteract the corrosive effect produced on the first passages. Of this nature is, in a pre-eminent degree, the castor-oil, combined with large draughts, either of the hepatised or soap-waters. A strictly antiphlogistic regimen ought now to be pursued, together with the remedies proper to obviate inflammation, and afterwards a milk-diet, lintseed tea, barley-water, gruel, and infusions of different mucilaginous vegetables, milk-chocolate without spice, aided by the enjoyment of fresh and pure air.

III. *Indications of cure, when the patient labours under a gradual and long-continued action of the poison; or in the secondary stages of the two former casualties.*

The principal object now to be attained, is the destruction of poisonous matter in the second passages, or to prevent its influence on the kidneys, biliary ducts, the organs of perspiration, &c. To ascertain whether the virus has diffused itself through the system, the person's state of mind and body should be comparatively examined; whether the former be dejected, or the latter reduced to preternatural debility; or whether any of the animal and natural functions be impaired. When there appears a blue ring round the eyes, and the lips exhibit a similar colour, we may conclude, that the devastation occasioned in the whole frame is considerable: and in such instances, Dr. BOERHAAVE advises to let the patient drink no less than *twelve pints* of luke-warm honey-water, in 24 hours, for 3 days successively; and to administer frequent clysters of the same liquid. By this simple treatment, he observes, all those painful and dangerous symptoms, which sometimes afflict the victims of this poison through the remainder of their lives, have been effectually obviated. On the contrary, M. NAVIER, a reputed French writer, on the effects of arsenic and its antidotes, recommends the method we have already pointed out, in propositions I. and II.; after which, he insinuates the propriety of re-commencing a milk-diet, and enjoins the patient to abstain from the use of all acid substances or liquors. In this opinion he is likewise supported by Dr. HAHNEMANN, who cautions the convalescent to be very attentive to his evacuations by stool; which, so long as he is subject to griping pain, and strictures in the abdomen, constantly require to be aided by the mildest purgatives. Beside these, he may drink decoctions of the *Lichen islandicus*, of the root called *Polygala senega*, or of quassia-wood, which last is, of all other corroborant and astringent remedies, the least heating, and consequently the most proper.

In order to prevent all the bad consequences resulting from this malignant poison, the patient may with advantage resort to the warm mineral, sulphureous waters, which he should not only drink plentifully, but likewise bathe in them, especially in the form of vapour. If such natural waters cannot be easily procured, they may be artificially substituted by medical men, who are, in general, perfectly well acquainted with their component parts, as well as the manner of preparing them. By their proper use, the unfortunate invalid may at length recover from that tremulating affection of the limbs, relaxation, paralysis, convulsions, and other distressing complaints, which the improvident swallowing of arsenic usually produces.

From a multiplicity of instances related by WEPFER, HEER, ZITTMAN, EBELL, and other writers, we have reason to conclude, that in our daily victuals, as well as by the use of glazed vessels, considerable portions of lead and arsenic are taken into the stomach, and mixed with solid food; though unattended with danger or inconvenience, except that of vomiting. Sometimes, however, where the digestive organs are in a languid state, the poison may lodge in the cellular membranes of the stomach and bowels, for several days or weeks, before it be evacuated. In such cases, the necessary consequence will be a slow hectic fever, for which the physician, who is generally consulted in the *secondary* stage of the disease, can assign no cause.

Lastly, we shall briefly mention, by what means and processes it may, after death, be discovered, whether a person have died from the poison of arsenic, though this knowledge properly belongs to the department of medical police or jurisprudence.

1. The contents of the stomach and intestines should be taken out, and washed in water. If any powder be contained therein, it should be allowed to separate; and if this be arsenic, it will fall to the bottom.

2. Place the separated powder on a red hot iron; and, if it evaporate in a thick white vapour, without melting, there is reason to conclude that it is arsenic:—this effect will take place with the fortieth part of a grain.

3. If this powder be mixed with charcoal, and emit an odour resembling that of garlic, we may also infer that it is arsenic.

4. The most convincing test of its nature is the following: inclose the mixed powder with the charcoal, between two small polished plates of copper (or between two perfectly smooth halfpenny-pieces), the edges of which must be cemented with a lute made of two parts of fine sand, and one of pipe-clay. Fasten the plates with a thin wire, and expose the whole to a red heat: thus the arsenical powder will be metallized; and, penetrating the copper, a blackish skin will first appear upon it, which being rubbed off, the parts touched by the arsenical vapour will acquire a whitish or leaden colour.

As this deleterious concrete frequently enters metallic compositions, especially those of copper and tin, it were much to be wished, that such compound metals could for ever be banished, at least from our kitchens.—See COPPER, LEAD, PEWTER, and TIN.

ART, as defined by Lord BACON, is a proper disposal of natural objects, by human thought and experience; so as to answer the several purposes of mankind; in which sense the word *Art* stands opposed to *Nature*: it is also used for a system of rules, serving to facilitate the performance of certain actions, and is then opposed to *Science*, or a system of theoretical principles.

Arts are generally divided into *useful* or *mechanic*, *liberal* or *polite*. The former consist of those in which manual labour has a greater share than intellectual exertion; and by which we are provided with the necessaries of life; whence they are denominated *trades*, as baking, brewing, carpentry, &c. The latter are such as depend on the application of mental abilities, and the active powers of a fertile imagination. Of this nature are, poetry, painting, music, and the like.

As a considerable degree of art is exerted in preparing food, manufacturing clothes, and erecting habitations, we may consider many of the useful arts to be nearly coeval with the human race.

In every country where the people are barbarous and illiterate, their progress, in this respect, is extremely slow.

The exertion of a national spirit, upon any particular art, excites activity in the prosecution of others. By incessant application, the Romans excelled in the art of war; and, having in the progress of society, acquired a taste for literature, their natural genius and talents were roused, and many of those who distinguished themselves in the Roman State, became authors.

The progress of the arts and sciences towards perfection, is also greatly promoted by emulation. Mathematics, for instance, appear to be on the decline in Europe; for, since the immortal NEWTON has far surpassed all the ancients, there appears to be little hope for the moderns, either of excelling, or equalling his creative genius.

In countries thinly inhabited, it is not uncommon to find one person exercising several professions, and this is productive, in some degree, of good effects. Various operations being carried on by the same individual, his mind becomes invigorated, because a combination of talents is required to perform the task; but, when the mental powers are restricted to a single object, all thought and invention are excluded, and the operator is, in a manner, converted into a dull and inanimate machine.

From the useful, naturally resulted the cultivation of the liberal arts. Persons who enjoyed every convenience from the former, turned their attention towards the latter: hence arose Sculpture, Statuary, Painting, Literary composition, &c.

The decline of the fine arts in Rome, is ascribed, by PETRONIUS ARBITER, to a cause which ultimately proves the destruction of mankind, wherever it prevails—such is *opulence*, with its never-failing concomitants, avarice and luxury. It has therefore been justly remarked, by acute observers, that during the rise and progress of empires, the *military arts* chiefly flourish; when arrived at their height, the *liberal arts*; and when in a declining state, the *arts of luxury*.

The fine arts are only relished by persons of taste, who can spare large sums for supporting them: thus it will be found, that they seldom, or never, flourish in countries where they do not obtain the liberal patronage of the sovereign, or men in power. On the other hand, the useful arts are always encouraged in every well regulated State. In short, the unexampled success of both, in this comparatively happy island, may be justly attributed to the sanction and munificence which men of talents and genius (whether natives or foreigners) uniformly experience from our gracious Sovereign, as well as from the nobility, almost without exception. No nation can boast of a greater number of *connoisseurs* and patrons, in the wealthy classes of society, than the British.

When a people are once roused from their indolence and lethargy, by whatever fortunate event or change of circumstances, the progress of the arts is generally rapid. Prosperity, contrasted with former penury, creates in the mind a spring which is vigorously exerted in new pursuits. The Athenians, while under the tyranny of PISISTRATUS, made but a mean appearance; but, on regaining their independence, were converted into heroes. This prosperity produced its usual effects, and Athens became the chief theatre of the arts and sciences.—The Corsicans, when engaged in a perilous war for the defence of their liberties, displayed a vigorous national spirit: they founded an university, a public library, and a public bank.—The Royal Society of London, and the Academy of Sciences

ences in Paris, were both instituted after civil wars, which had animated the people, and excited their activity and emulation.

Democritus maintained, that men were indebted for the acquisition of their arts to brutes; that the spider taught them *weaving*; the swallow, *building*; the nightingale, *music*, and so forth.

There are various particular arts, as those of Memory, Swimming, Deciphering, &c. of which we propose to treat in their respective places.

Artemisia absinthium, L. See Mugwort.

ARTERY, or a pulsating blood-vessel, is a cylindrical canal, conveying the blood immediately from the heart to all the parts of the body. On examining the structure of the largest of these vessels, such as the *aorta*, and the pulmonary artery, it may be distinctly seen, that each is composed of three coats; namely, 1. The external coat, which is of a cellular texture, loose on the outside, but growing progressively firmer towards the inner part; 2. A fibrous spiral, or rather circular membrane, of a yellowish colour, and of which there are several strata, according to the size of the artery; 3. The innermost coat, or a thin, extremely smooth and transparent membrane, keeping the blood in its canal, which otherwise, upon the dilatation of an artery, would easily separate the spiral fibres from each other.

From the trunk of every artery there arise branches: from these again extend ramifications of blood-vessels, which become progressively smaller, so that their distribution may be traced by the microscope, in more than twenty different divisions, nay, to an almost infinite number. The arteries, however, do not, as has been erroneously asserted by several anatomical writers, become narrower, and assume a *conic* form in their continued progress; on the contrary, they seem uniformly to remain *cylindrical*, insomuch that, in their ramifications, a smaller cylinder always arises from a larger one, and where the former proceeds from the latter, it generally presents a slight swelling at this vascular joint, if this expression be admissible. The aggregate diameter of all the branches of one trunk is somewhat larger than that of the trunk itself; an observation which also applies to the veins.

On account of their thicker membranes, the arteries possess a greater degree of elasticity than the veins; though the latter are more capable of resisting the mechanical force of the blood, and are less liable to rupture. It farther deserves to be remarked, that, with the increase of years, the coats of the arteries acquire firmness, while those of the veins become weaker. This in some measure, accounts for the circumstance that persons, between the age of eighteen and thirty-five, are more liable to phthisical and other complaints, which depend chiefly on an increased action of the arterial system; because, after that period, the arteries already possess sufficient vigour and firmness, to overcome the additional impetus of the circulation. Hence, too, we may comprehend why sthenic or inflammatory diseases seldom occur at certain stages of life, when the whole system possesses that degree of re-action, which is necessary to maintain a due equilibrium between the animal and vital functions, as well as to resist the occasional impressions made on the body, by sudden vicissitudes of heat and cold, moist and dry air, &c.

All the arteries derive their origin from the ventricles of the heart; namely, the pulmonary artery from the right, and the aorta from the left; of which two the rest are branches. They terminate in veins, exhaling vessels, or *anastomose* with one another, that is, unite by inosculation. It is asserted by physiologists, that the circulation of the blood, its heat, red colour, fluidity, assimilation of food, &c. the conversion of fixed into volatile salts, and the performance of the different secretions, such as bile, urine, saliva, &c. all must be attributed to the contractile power of the arteries and the heart.—See ASSIMULATION, BILE, BLOOD, CHYLE, SALIVA, URINE, &c.

It is farther worthy of notice, that an injury received by a very considerable vein, is not nearly so dangerous as that of a small artery, especially in the vicinity of the heart.—(See BLEEDING, or *Hemorrhage)*; and that single arteries sometimes become *ossified*, or acquire a cartilaginous and bony consistence. In the larger ones, this phenomenon rarely occurs: yet a very remarkable instance of an ossification of the aorta is recorded by the celebrated Dr. ZIMMERMAN, the author of the classical treatises "*On Solitude*," and "*On National Pride*," in his excellent work "*On Experience in Physic*;" which deserves to be read and studied by every medical and philosophical inquirer. Such preternatural production of bone is attributed to an abundance of earthy particles, which are, perhaps, generated by a too liberal use of tart wines, veal, potatoes, cheese, and all food that is hard and difficult of digestion. Fortunately, however, this fatal conversion of membraneous substance takes place only at an advanced age; but then it affords little or no hope of prolonging the patient's life.—See HEART, PULSE, VEINS.

Arthritis. See GOUT.

ARTICHOKE, or the *Cynara*, L. though an exotic, is a plant well known and much cultivated in this country. There are four species, but only two are reared for use, viz. the *scolymus*, or garden artichoke, and the *carduncülus*, or cardoon, both of which are propagated by slips, or suckers, arising in spring, from the roots of the old plants. The slips should be taken from good plants in March, or the beginning of April, and set in an open quarter of the kitchen-garden, in rows at the distance of five feet from each other. By this process, artichokes may be produced in the autumn of the same year. The size of their fruit will gradually diminish, after the third or fourth year, though the roots continue sound for several seasons. The cardoon, which is a hardy plant, may be propagated by seeds sown in March. As these plants are very large, they ought to be placed at the distance of several feet from each other; and thus crops of spinach, endive, cabbage, or brocoli, may be raised between the rows. About Michaelmas, the cardoons generally attain to a considerable size; the leaves of each plant should then be tied, that they may be hoed, for the purpose of blanching; which will require six or eight weeks. Thus the plants will be fit for use in November or December, and continue the whole winter.

Artichokes flourish best in a rich and moist soil; but if it be too wet, the roots are apt to decay in severe frosts. They have been used with advantage in the making of soda; and the leaves of the *scolymus*, prepared with bismuth, impart to wool a fine and permanent gold colour.

ARTICHOKE, the *Jerusalem*, is a plant of the same genus as the sun-flower. It produces bulbs at its roots, has been long cultivated in gardens as an esculent vegetable, and, except that it is watery and of a softer consistence, in many respects resembles the potatoe, but is not in such general esteem. This root, however, is much valued for feeding hogs and store-pigs. Mr. PETERS, the author of "*Winter Riches*," published in the year 1772, asserts, that from one acre of ground, he obtained between seventy and eighty tons of this root. He is of opinion, that seven acres will yield three hundred and ninety-six tons, which will keep one hundred swine for six months, allowing each head fifty-six pounds per day, at an advance of value from ten to fifteen shillings, especially if they be boiled with *sweet* hog-wash.

When these roots are given to horses, they should be washed, cut, and ground in an apple-mill: the proportion given at each time is eight pounds, with two ounces of salt, and a bite of hay thrice daily.

Another celebrated cultivator found the produce of this root to be about four hundred and eighty bushels Winchester measure, per acre, without any dung. Its chief recommendations are, the certainty of a crop; its flourishing almost upon any soil; not requiring manure, and being proof against the severest frosts.—The culture is the same as that of potatoes.

ARTICULATION, in language, is the division of sounds into distinct syllables; and consists in giving every letter its due proportion of sound, so that the hearer may perceive and determine their number without difficulty; while he is enabled to ascertain the respective letters in every syllable.

The late Mr. THOMAS SHERIDAN, however, has endeavoured to prove, in his "*Course of Lectures on Elocution*," published about the year 1762, that the *English* language is by no means calculated to answer the purpose of reading aloud to others. This strong-headed grammarian maintains, that as our *written* language has no *visible* marks of articles, it is defective in the most important requisites to a just delivery of speech.

A *just delivery*, we are told, consists in a distinct articulation of words pronounced in proper tones, suitably varied to the sense and emotions of the mind; with due observation of accent; of emphasis, in its several gradations; of rests or pauses of the voice, in proper places, and well-measured degrees of time; and the whole accompanied with expressive looks, and significant gestures. Of these essential characters, two only are at all regarded in the art of writing: namely, articulate sounds or words, which are marked by letters; and stops, or pauses of the voice, which are denoted by little figures or tittles. But with respect to the other articles, of tones, accent, emphasis, and gesture, there are no visible marks to guide the reader: these, it must be allowed, are the sources of all that is pleasurable or forcible in delivery; and contain in them all the powers of impressing the mind, captivating the fancy, rousing the passions, and delighting the ear: and it must also be admitted, according to our author, that the articles most essential to a good delivery, have been entirely neglected in the graphic art.

Of the numerous instances of imperfect, or vitiated articulation, according to Mr. SHERIDAN, there is not one in a thousand which arises from any natural defect or impediment.

"To cure any imperfection in speech, arising originally from too quick an utterance, the most effectual method will be (Mr. SHERIDAN says), to set apart an hour every morning, to be employed in the practice of reading aloud, in a very slow manner. This should be done in the hearing of a friend, or some person whose office it should be to remind the reader, if at any time he should perceive him mending his pace, and falling into his habit of a quick utterance. Let him sound all his syllables full, and have that point only in view, without reference to the sense of the words; for, if he is attentive to that, he will unwarily fall into his old habit; on which account, that he may not be under any temptation of that sort, Mr. SHERIDAN would have him, for some time, read the words of a vocabulary, in the alphabetical order. In this way, he will soon find out what letters and syllables he is apt to sound too faintly, and slur over. Let him make a list of those words, and be sure to pronounce them over distinctly, every morning, before he proceeds to others. Let him accustom himself also, when alone, to speak his thoughts aloud, in the same slow manner, and with the same view. Otherwise, though he may get a habit of reading more slowly, he will fall into his usual manner in discourse: and this habit of speaking aloud when alone, will not only bring him to a more distinct utterance, but produce a facility of expression, in which silent thinkers are generally defective.—See the articles LANGUAGE, READING, SPEECH.

ARTIFICER is a person employed in manufacturing any kind of goods or wares, such as those of iron, brass, wool, &c. Of this description are smiths, braziers, and weavers. They are distinguished from *artists*, by exercising professions which require an inferior degree of taste and genius; on which account they might more properly be called *artisans*.

By the English laws, artificers in wool, iron, steel, brass, or other metal, leaving the kingdom, and departing to a foreign country, without license, are liable to be imprisoned for three months, and fined in a sum not exceeding one hundred pounds. Those who go abroad, and do not return on receiving notice from our Ambassadors, are disabled from holding land by descent or devise; from receiving any legacy, &c. and are deemed aliens. A penalty is also inflicted on those who seduce artificers to quit their native soil.

The author of an excellent treatise "*On the Laws and Policy of England*," published in 1765, on considering the effects which plenty and scarcity of provisions have on our manufacturers, justly observes, that we should endeavour to render

der the expence of living cheaper than it is *abroad*, in order to reduce the price of labour, which will enable us to offer our merchandizes at a cheaper rate, and consequently obtain a preference to all the foreign markets: for as *plenty* or *scarcity* will determine the *price of provisions*, so the price of provisions will in general regulate the *price of labour*; and this again will influence the *price* of all commodities and productions. Hence he asserts, that it will avail but little, to impose penalties on those who raise the price of provisions, unless the same be also inflicted on such persons as combine to raise the price of labour; that a *general liberty* granted to produce our necessary provisions, will procure us a *general plenty* for sale; that a *general indulgence* allowed to *sale*, will reduce them to a general cheapness; that a *general cheapness* will enable our poor to work in every occupation upon more moderate terms—an expedient the most necessary in this country; because, as Englishmen will not submit to that coarse fare to which some of our neighbours are accustomed, a reduction of the price of provisions is the only method we *can* resort to, for an abatement in the price of labour.

These remarks are peculiarly applicable to the present times, when every description of artisans are combining to raise the price of their labour; the natural consequence of which is, that an almost entire stagnation has taken place in many of the principal trades exercised in the metropolis. It is not our province to enter on an investigation of the justness of those claims made by the different journeymen. In some manufactures and trades, the law has limited their demands; in others, they are submitted to the decision of a court of justice; but, as the latter is both an expensive and tedious experiment, on account of the difficulty of procuring the necessary information, the evil frequently remains without redress.

Under the ancient *regime* of France, the magistrates had the power of deciding all disputes between masters and journeymen, without the interference of a solicitor or counsel: this measure, though apparently *despotic*, was attended with the best effects, inasmuch as the public was not liable to be injured by the conspiracy of a few individuals.

ARTIST is an appellation given to a person skilled in some particular art, such as that of watch-making, engraving, &c.

EVELYN informs us, that a privilege is granted to artists at Vicenza, similar to the *benefit of clergy* in England; by virtue of which, criminals adjudged to death are pardoned, if they can prove themselves the most excellent and consummate workmen in any art.

Artocarpus. See BREAD-TREE.

Arum. See WAKE ROBIN.

Arundo. See REED.

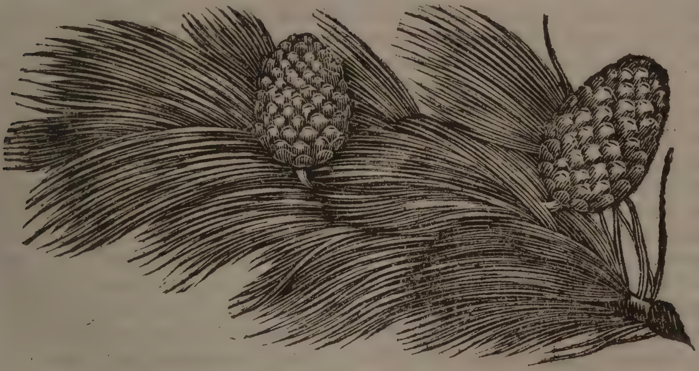
ARVENUSLY, or *Pinus Cembra*, L. is a species of pine, which is principally found in Siberia, and on the Alpine mountains. Its branches resemble those of the pitch-tree, which is commonly called spruce-fir. The leaves are of a striated form, about three inches in length, and the fruit about the size of a large hen's egg, containing kernels covered with a brown skin, which, when peeled, are as large as a common pea, white and soft as a blanched almond, and of an agreeable taste.

The arvenusly is applied to various purposes of useful and domestic economy. Its planks afford excellent wainscoting, flooring, and other materials for joiners; are of a finer grain, more beautifully variegated, and of a more agreeable smell, than deal. The white wood has a very pleasant fragrance; and when made into shelves, is said to possess the remarkable property of keeping away moths and other insects. It also furnishes excellent fuel for stoves, ovens, and kilns; but is dangerous when used in grates, being liable to splinter, and throw out sparks to a considerable distance. From the resinous parts of this tree, is distilled a fragrant oil, resembling in taste and flavour that of juniper, and possessing the same properties. An expressed oil is also obtained from the fruit, which, on account of its balsamic nature, has been recommended in consumptive cases; and the kernels are employed by the Swiss, as a substitute for mushrooms, in ragouts, and sometimes form a part of their desserts.

The arvenusly is of a healthy and vigorous nature, and will bear removing, when young, even in dry and warm weather. It likewise grows in great abundance on the most mountainous and coldest parts of the Briançonnois, where the natives call it *alvies*. It bears some resemblance to the Canada, or Weymouth pine.

This tree is the more valuable, as its timber is fit for the choicest furniture; and from its enormous height and size, when full grown, it would make excellent masts.—As the culture of this remarkable tree in no respect differs from the other species of the Pine, we refer to that article.

We have here subjoined a branch of the Arvenusly, of a reduced size, to distinguish it from other species of the same genus.



ASAFŒTIDA, a gum-resin, so called on account of its offensive smell. It is obtained from the *Ferula asafœtida*, L. an umbelliferous plant, growing wild in Persia; the root of which, on cutting it, exudes a milky juice: by evaporation, it acquires a consistence of wax, and a yellowish red colour. We have seen fine specimens of this plant in the Botanical Garden at Edinburgh; and there is no doubt that it will bear the vicissitudes of our climate, in the open air; and that it is strongly impregnated with its peculiar juice.

Although this nauseous drug possesses a bitter and acrid taste, which is much stronger, when fresh, the Persians nevertheless use it as a spice with their food; so that our epicurean imitators do not deserve the credit of original choice.

Beside its aperient and resolvent properties, asafœtida is one of the most valuable medicines in spasmodic, flatulent, hysteric, and hypochondriacal complaints, especially when they arise from obstructions of the bowels. But, as it is of a heating nature, it increases the circulation of the fluids, and ought not, therefore, to be employed either in violent fevers, or in constitutions liable to hemorrhages. On the contrary, where spasms and constipations have contributed to weaken the powers of nature, and the functions are in a languid state, it generally affords effectual relief; as it promotes digestion; enlivens the animal spirits; and, by increasing the peristaltic motion of the intestines, tends to open them in persons of an advanced age. In the spasmodic, as well as in humoral asthma, unattended with fever, it is an excellent remedy; for, in the former, it counteracts the strictures of the respiratory organs; and, in the latter, greatly facilitates expectoration. The hooping-cough has been cured, and worms have frequently been expelled, by the conjoined administration of asafœtida, both by the mouth, and in the form of clysters. When given with the last-mentioned intention, it is very usefully combined with jalap; by the assistance of which, it possesses uncommon powers over the *tape-worm*, especially in adults. Thus, according to C. J. MELLIN, an elderly lady was relieved of a formidable tape-worm, together with a considerable portion of coagulated and viscid matter, resembling a fishing-net, after making use of the following pills: Take asafœtida, half an ounce, powder of jalap two drachms; let them be mixed with any syrup, to a proper consistence for making sixty pills: two of these are to be taken every morning and evening, at first; but gradually increased to four or five, according to circumstances.

ASARABACCA, in botany, the *Asarum Europœum*, L. is an English, though rare* plant, growing in the northern woody parts of this island. A good representation of it is given in Dr. WOODVILLE's *Med. Bot.* Pl. 86. It produces large bell-shaped flowers of a dusky purple colour, and blossoms in the beginning of May.

As a medicine, the different properties of this plant render it an object of attention: hence LINNÆUS proposed it as a substitute for ipecacuanha; and, according to Dr. CULLEN, "the root, dried only so much as to be powdered, proves in a moderate dose a gentle emetic." But as the internal use of the asarabacca is precarious, the London College have justly rejected the *root*, and directed the *leaves* only to be employed as an *errhine*, or sneezing powder, with the addition of one-half of dried lavender-flowers. Thus carefully prepared, and snuffed in small doses of a few grains, several successive evenings, Dr. **Woodville** says, "it produces a pretty large watery discharge, which sometimes continues several days together; and by which, head-ach, tooth-ach, ophthalmia or inflammation of the eyes, as well as some paralytic and soporific complaints, have been effectually relieved." That such is the effect of this powder, we have frequently observed from experience, though there is reason to doubt whether its action extends to palsy, as it more particularly affects the salival glands, which is obvious from the copious spitting it generally occasions, after being used for a few evenings.

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* It is extremely scarce: RAY observes, in his Latin history of British Plants, p. 207, that he found it in some woods in Lancashire.

In farriery, the powdered root of this plant is given mixed with bran, to horses troubled with the *farcy*, or leprosy, in doses from one to two ounces;—as likewise for worms in either horses or sheep.

Dyers may also usefully employ the fresh leaves or roots of the asarabacca, for producing first an apple-green, and by boiling them still longer, a light-brown colour, on wool prepared with bismuth. These experiments are related by **Dambourney**, whose work we first quoted, p. 19.

Asarum. See Asarabacca.

ASCARIDES, in zoology, belong to the order of *vermes*, and are divided into two species: 1. the *vermicularis*, distinguished by a transverse mouth, and faint annular rugæ, or folds. It is about a quarter of an inch in length, and is found in boggy places; in the roots of decayed plants; and very frequently in the rectum, or straight gut, of children and horses. 2. The *lumbricoides*, which is equal in length with the *lumbricus terrestris*, or common earth-worm, but wants the protuberant ring towards the middle of the body, which is its only distinguishing mark. Its body is cylindrical, subulated at each extremity; but its tail is somewhat triangular. This is the worm which is most commonly found in human intestines, and its usual seat is the rectum. The symptoms are, an uneasiness and intolerable itching in the anus, which generally take place in the evening, and sometimes prevent sleep. They are often attended with so considerable a degree of heat, as to produce both an external and internal swelling in that intestine; which, if not quickly relieved, bring on a *tenesmus*, or a frequent inclination to go to stool, accompanied with a mucous dejection. There are also frequent griping pains, in the lower part of the abdomen, a little above the *os pubis*; if these be acute, they are succeeded by a bloody mucous discharge, in which these worms are often found alive.

Mucus, or slime, appears to be the proper nest of the ascarides: in this they live, are nourished, and preserved unhurt, though surrounded with many other fluids, the immediate contact of which would to them prove fatal. Purges, by lessening this viscous matter, never fail to relieve the patient; for those worms, which are not expelled by the increased vermicular motion of the intestines, for want of a proper quantity, languish, and at last die; as may be seen in those which are taken out of their mucus and exposed to the open air. Such purges, therefore, as act briskly, and can be conveniently repeated, for instance, purging waters, and jalap, especially for children, two grains of which may be mixed with sugar, and taken daily, are the most effectual. When the tenesmus, or mucous stools, are urgent and distressing, a clyster of warm milk and oil will afford immediate relief. The most useful purge, is cinnibar and rhubarb, of each half a drachm, which, when taken, seldom fail to bring away a transparent mucus, containing many of those worms alive. Various other remedies have been employed in the removal of this troublesome complaint, of which quicksilver, calomel, and powder of tin, are the principal. The inhabitants of Jamaica are said to use the *Geoffraea-inermis*, or cabbage bark, with singular success. Dr. DUGUID, a surgeon of that island, declares, that it is the most safe, and yet most powerful, vermifuge ever known, and that it frequently brings away as many worms by stools, as would fill a hat. He owns, however, that it sometimes produces violent effects, but these take place only, when it is used in the form of a strong decoction, instead of small doses of the powder. Yet we cannot, on this occasion, omit to warn every affectionate parent, against tampering with such *powerful* remedies as may prove destructive to their children; nor to trust to the impudent assertions of daring advertisers of *vermifuges*.—See WORMS.

Ascites. See DROPSY.

Asclepias. See SWALLOW-WORT.

ASH, or the *Fraxinus*, L. is a genus of which there are six species. Of these, the most useful is the common indigenous ash, or *Fraxinus excelsior*, L. which is well known to every rural economist.

A plantation of these trees, when properly managed, seldom fails to prove of great advantage to the owner; for the underwood, which is fit to be cut every eight or ten years, will produce a regular income, more than adequate to defray the rent of the ground, and other charges; besides which, the trunk or stock preserved for timber, will be worth forty or fifty shillings and upwards, per tree. It flourishes best in groves, but grows well in the rich soil of open fields: it also bears transplanting and lopping. In the north of Lancashire, they lop the tops of these trees in autumn to feed cattle, when the grass is on the decline.

The ash-tree delights in a rich, light soil; it attains its greatest height and perfection when at an age of from forty to fifty years. Although it also grows in wet and loose grounds, yet, when reared in these, its wood becomes less firm and durable. It prospers remarkably well on a white calcareous soil, and is also frequently found in a thriving state near brooks and rivulets.

Planting.—The Society for the Encouragement of Arts, &c. at London, considered the cultivation of the ash of so much importance, that, in the year 1779, they gave a premium of twenty pounds, and in 1780 their gold medal, to Mr. DAY, of Friendsbury, near Rochester, for an account of his successful method of rearing it. The whole is detailed in the first volume of their Transactions; and we shall only observe, that Mr. DAY is enabled to plant one thousand trees for two shillings: by his method, fourteen acres, three quarters, and thirteen rod, out of sixteen acres, three quarters, and twenty-seven rod, are planted at the distance of four feet, by two. To fill this extent of ground, there are required 80,682 plants: two acres and fourteen rod are planted at a distance of two feet, by eight inches, which takes up 66,400 plants. The reason for planting twice as thick one way as the other, is, that in such manner they are much easier to till. He has ascertained by experience, that there is an essential difference between wild ash and those which are trained: hence he advises all the crooked ones to be rejected, and particular attention to be paid in getting the ash-keys. There is another advantage attending his plan, that potatoes may be planted between the rows.

The emulation excited by the above and similar premiums, produced such effects as might be expected to result from so extensive and honourable a patronage. In the year 1790, the gold medal of the Society was adjudged to **Lewis Majendie**, of Hedingham Castle, Esq. and the silver medal to H. G. **Fausset**, of Heppington, near Canterbury, Esq. The first mentioned gentleman planted on seven acres and twenty-one poles, of a principally loamy soil, the surprizing number of nineteen thousand trees, of four and five years old, at intervals of four feet. In a subsequent paper, Mr. M. recommends the soil to be completely trenched, previous to planting.—Mr. **Fausset** intermixed willow with his ash, and planted them at the distance of three feet and a half, in the proportion of three willows to one ash; so that, on the decay of the willows, the ash plants remain seven feet asunder. The following is a sketch of his method: the stars denote the ash, and the dots the willow-plants.

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The ash, when young, requires constant cultivation, for want of which it will be stinted in its growth, and often remain for twenty years together without making any progress; it is brought forward much sooner, when sheltered by other plants.

An improved method of planting this tree, for hurdles, hoops, laths, fencing, and what is termed post and billet for collieries, is described by a correspondent in the fifth volume of the Papers published by the Bath Society.

The leaves of the ash appear late and fall early: it is therefore unfit to be planted for protection or ornament. Its timber ranks next in value to the oak; and it ought, when sold, to be measured to a much smaller girth than either oak or elm.

The wood of ash possesses the uncommon property of being almost uniformly good, whether of young or old trees. It is hard, tough, and much used in making the different implements of husbandry, but particularly for hop-poles. Its ashes afford very good pot-ash; and the bark is employed in tanning calf-skins. The seeds are acrid and bitter, and the leaves have been used for the adulteration of *tea*. Poor people formerly derived considerable advantage by collecting them; but we understand this practice has been prohibited, as it tends to diminish the revenue. We may, however, venture to say, that the leaves of the ash are as wholesome as those of the tea-tree: the latter, like most other evergreens, is of a doubtful, if not pernicious, quality, independently of the circumstance, that our teas may also partake of the fraudulent practices of the Chinese, to which most of their goods are liable.

In rural economy, it has been asserted, that the leaves of the ash impart a bad taste to milk; and it is therefore seldom suffered to grow in dairy farms. Those leaves, however, are eaten with avidity by horses, sheep, and goats, for which animals they are considered as good fodder.

The bark of the common ash is used in dyeing. It is placed for some time in water, with a solution of vitriol, by which the water acquires a black colour. The Morlachians boil the bark for the space of eight days, with the dross of iron, and, when the solution has grown cold, they use it for dyeing black. With *cold* water, the bark makes a lixivium of a variegated colour, which displays azure and greenish shades; but *boiled* water is not proper, as it renders the dye thick and brown. *Warm* water is preferable, as this produces a blueish lixivium, which imparts a fine blue colour to yarn, particularly if it has been previously dyed yellow. According to DAMBOURNEY, the fresh shavings of ash, give to wool, prepared with bismuth, the true and permanent *vigogne* colour.

ASHES, generally speaking, are the remains of bodies reduced by fire. There are vegetable, animal, and mineral ashes; but the first only are strictly entitled to that appellation. We understand, that the French have recently contrived a process of converting the ashes, or residuum of animal substances, decomposed by burning them, into glass, similar to that which is produced in the manufacture of this article, when siliceous earth and wood-ashes are the principal ingredients. This curious conversion of human bodies into a transparent and most beautiful metal, is an ingenious imitation of the practice frequently adopted among the ancients, with a view to preserve the sacred remains of their reverend ancestors, or of persons of great worth and merit. But, whether such expedients, if they ever should become general, be compatible with the refined feelings of relations and friends in other countries, we submit to the determination of our sentimental readers. If we may be allowed to express our opinion on so delicate a subject, the scheme now followed, in this respect, by the ambitious conquerors of, and in France, may be a very *economical* one, for saving the expences of an ostentatious funeral; and, as such, we have mentioned it in this work: but we doubt, whether there may be found many individuals in this country, except those few among the *emigrées*, who incline, or deserve, to receive the honours of combustion.

Mineral bodies, when reduced by fire, are properly called CALXES, of which we shall treat under that distinct head.

There is a great variety of *wood-ashes* prepared from different vegetables. We have already described the properties of ALKALIES (p. 29), and shall at present observe, that vegetable ashes contain a great quantity of *fixed salt*, blended with earthy particles; and that from these ashes are extracted the fixed alkaline salts, called POTASH,

ASH, PEARL-ASH, BARILLA, &c.; of the preparation, and properties of which, we propose to treat under their respective heads. Confining, therefore, our account to ashes, in their unchanged and crude state, we shall give the following description of the different useful purposes to which they are subservient, in domestic and rural economy.

About half a century ago, Dr. FRANCIS HOME, of Edinburgh, who may be considered as the earliest benefactor of the Scottish cotton manufactories, justly observed, in an ingenious treatise, entitled, *Experiments in Bleaching*, that the proper application of alkaline leys, is one of the most important and critical articles in the whole process of that art. This circumstance induced him to inquire, after the *mathematical* method of investigating truth, into the nature and composition of the several sorts of ashes used for this purpose. With due deference to the talents of his genius, that has apparently been misled on this *early* occasion, we cannot but regret that Dr. HOME appears then to have been unacquainted with a strict analytical and synthetical investigation of natural bodies; a method which, we venture to say, might have enabled him to anticipate many of the subsequent discoveries, made in chemistry by the French, Swedish and British philosophers of the anti-phlogistic school. He is, however, justly entitled to the praise and gratitude of his countrymen; among whom he greatly contributed to excite a spirit of research, into the *useful* phenomena of natural bodies; a spirit which has already proved highly beneficial to the community at large, and eminently conducive to the honour of that celebrated University, in which he is now the oldest professor *.

In the treatise before alluded to, the author *originally* proposed the use of *oil of vitriol*, instead of the acids formerly used for bleaching linen, such as butter-milk, sour milk, infusions of bran, or rye-meal, &c. kept for some days, till they acquired a proper degree of acidity. He proved by experiments, that the vitriolic acid is by no means injurious to the cloth; is less expensive, more expeditious, and on all accounts equally, if not more, efficacious.

Many and curious were the experiments which Dr. HOME then instituted, on the different ashes; and from the result of which he concluded, that *pearl-ashes* contain a pure alkaline salt, with a small proportion of vitriolated tartar and absorbent earth. In the composition of Russian and Swedish ashes, he discovered a considerable quantity of lime; a discovery which amply evinced the wisdom of an Act of the British Legislature, which prohibited the use of lime in bleaching. For, though lime-water alone greatly contributes to whiten cloth, yet it is apt to render it much weaker; but that *alkaline salts added to lime, diminish its power of weakening and corroding, in proportion to the quantity of these salts added to the lime.* This observation suggested to him a hint of supplying the Muscovy ashes, at home, by a preparation which experience proved to answer all the intended purposes of those ashes. After repeated trials of different proportions, the method of making this profitable substitute, consists in adding one-fourth of pot-ash dissolved in a little water, to three quarts of quenched lime. Whether this process has been found generally successful, we have not been able to ascertain.

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* We believe he is near NINETY years of age.

In rural economy, ashes have, since the days of VIRGIL, been considered as one of the best, and easiest, means of fertilizing land; yet many objections have been started, by modern writers, against their use; probably because they were indiscriminately employed for *all* kinds of soil, whether moist or dry, cold or warm, loose or clayey. Hence we need not be surprised that agriculturists have differed in opinion on this subject. Without detaining the reader with speculations concerning the manner in which ashes act on the soil, in promoting its fertility, we shall briefly observe, on the authority of the best writers, supported by experience:

1. That vegetable ashes, in general, are most effectual for manuring moist, cold, boggy, marshy, or uncultivated soils.

2. That ashes are no less fit for manure, after the salt is extracted from them, than before; and, if there be any difference, it is in favour of the washed ashes.

An anonymous correspondent in the Gentl. Mag. for June, 1766, appears to have derived the first hint respecting the advantages of *peat-ashes* in dressing land, and a method of preparing coal-ashes for the same purpose, from the *Dictionaire Economique,* or the Family Dictionary, translated from the French by the late Prof. BRADLEY, of Cambridge, and published in 1725. In this curious work, which equally abounds with excellent and frivolous remarks, we find the following passage: "Turf and peat ashes must needs be very rich, much after the same manner as burning of land." Perhaps it is in consequence of this suggestion, that we find in the Magazine before alluded to, an account of too interesting a nature to withhold it from our readers.

Peat-ashes, properly burnt, afford an excellent manure for both corn and grass-land; but the most valuable are those obtained from the lowest stratum of the peat, where the fibres and roots of the earth are most decayed. This will yield a large quantity of very strong ashes, of a colour, when recently burnt, resembling vermillion, and of a very saline and pungent taste. Great care and caution should be used in burning these ashes, and likewise in preserving them for future use. The method of burning them is similar to that of making charcoal. After the peat is collected into a large heap, and covered so as not to flame out, it must be suffered to consume slowly, till the whole substance is reduced to ashes. Thus burnt, they are found excellent in sweetening sour meadow-land, destroying rushes, and other bad kinds of weeds, and producing in their place great quantities of excellent grass. In some parts of Berkshire and Lancashire, they are considered one of the best dressings for spring crops.

A very great improvement may likewise be made, and at a moderate expence, with *coal-ashes,* which, when properly preserved, are a most useful article for manure. By putting one bushel of lime, in its hottest state, into every cart-load of these ashes, covering it up in the middle of the heap for about twelve hours, till the lime be entirely fallen; then incorporating them well together, and by turning the whole over two or three times, the cinders, or half-burnt parts of the coals, which, instead of being useful, are noxious to the ground, will be reduced to as fine a powder as the lime itself. For this purpose, however, the coal-ashes should be carefully kept dry: and, thus prepared, they are the quickest breakers and improvers of moorish and benty land.

Professor BRADLEY, in his dictionary before mentioned, farther observes that *soap-ashes* are highly commended by Mr. PRATT, as being, after the soap-boiler has extracted them, eminently fructifying; and that the ashes of any kind of vegetables are profitable for enriching barren grounds, as they promote the decomposition of moss and rushes, in a very great degree. The best season for laying them, either for corn, pasture, or meadow, is said to be in the beginning of winter, in order that they may the more easily be dissolved by showers of rain.

Having given this view of the subject, from the collective experience of British writers, we shall also communicate a few practical facts, derived from authentic German authors.

According to their experience, *pot-ash* is most usefully employed for correcting a sandy and loamy soil; the ashes obtained from the hardest woods, being the most beneficial, and among these, the beech and oak are generally preferred. A small addition of quick-lime to the pot-ash, tends considerably to increase its fertilizing property.

The refuse of *soap-boiler's ashes*, is likewise used in Germany with the best effect, when sprinkled, soon after sowing, either in spring or in autumn, as closely as possible, over the fields of wheat, rye, spelt, lentils, pease, beans, barley, lint-seed, hemp, millet, and similar grain. An acre of wheat, or barley, requires however a much greater proportion of these ashes, than one sown with rye, or corn of an inferior quality. They are farther employed with great advantage, by scattering them on meadows in the early part of spring.—See also COALS.

ASPARAGUS, also called Sparagus, Sperage, or Sparrow-grass, is an esculent plant, which is reared with great attention, and much esteemed on account of its delicate flavour. There are ten species, but one only is cultivated for the table, viz. the common asparagus, which has an erect herbaceous stalk, and bristly leaves: the other species are sometimes kept in the gardens of the curious, but more for the sake of variety, than on account of their utility.

This useful plant is best propagated from the seeds, and its successful culture almost entirely depends on the proper quality of such seed. Hence, some of the most promising buds should be marked with a stick, and when the seed begins to ripen, and the stalks to wither, they ought to be cut, and the berries being rubbed off into a tub or other vessel, water should be poured upon them. After they have been stirred, the seeds will subside, and the floating husks may be poured off with the water. The seeds must then be spread to dry, and thinly sown, in the beginning of February, on a bed of rich earth. They should be trod into the ground, and the earth raked over them.—During summer, the bed should be kept clean of weeds, and about October, when the stalks appear withered, a small quantity of rotten dung should be spread over the bed, about half an inch in thickness. In the following spring, the plants will be in a proper state for transplanting; when the ground should be prepared for them, by trenching it, and disposing a large quantity of rotten dung in the trenches, so that it may lie at least six inches below the surface; after which, the whole plot must be levelled, and all the loose stones carefully picked out. The most eligible situation for such hot-beds, is a south-eastern aspect, sheltered from the north; and the soil should be neither too moist, nor too firm, or hard. If the season be forward, and the soil dry, the asparagus should be transplanted in the beginning of March; but, in a wet soil, it is preferable to wait till the beginning of April, at which time the plants begin to shoot. The roots should, at this season, be carefully raised with a narrow-pronged dung-fork, shaking from them the adhering earth, separating them from each other, and laying their heads even, for the greater convenience in planting them: which should be performed in the following manner: Lines are drawn across the bed, at a distance of one foot from each other, after which they must be dug in the form of small trenches of six inches in depth, into which the roots must be laid with their buds upwards, so that when the earth is raked over them, they may be two inches under the surface. A space of two feet and a half should be left between every four rows, for the purpose of affording room to cut the stalks. At the time of planting, onions may be sown on the ground; after the lapse of a month, the asparagus will begin to shew its buds, when the former must be thinned, and the weeds carefully removed. By August the onions will be fit to be collected. In October, the shoots of the asparagus should be cut within two inches of the ground; but, with respect to this process, the following circumstance deserves attention: as often as a stalk is cut, a new one springs up, and every plant running to seed deposits a new bud or eye, as it is called by gardeners, beside the new shoots, which sprout the following spring. Hence, the cutting ought not to be too long continued, as this practice would prevent the new shoots from sprouting, and deprive those which are in bud, from acquiring sufficient strength.

Young asparagus fit for table, may be cut the second spring after planting; but, as this early fruit is with many a desideratum, the following directions, properly attended to, will enable them to produce it at any time during the winter: Take some good roots of one year's growth, and plant them in a rich, moist soil, about eight inches asunder; the second and third years after planting, they will be fit for removal to a hot-bed, which should be made rather of heating materials, especially tanner's waste and horse-dung, about three feet thick, and covered with a stratum of earth, six inches high. The plants should then be laid against a ridge made at one end, without trimming or cutting the fibres; between every row, make a small ridge of fine earth, and thus proceed until the whole is planted; next, let the bed be covered to the thickness of about two inches with earth, and encompassed with a straw-band. About a week after, the whole should be sheltered under frames and glasses, and three inches of additional earth laid on the beds; the proper season for constructing which is from November to March.

Dr. Darwin advises the loosening, or turning over the earth, around and above the roots of this plant annually, for the purpose of admitting air into its cells or cavities, to convert a part of the manure, or carbonaceous soil, with which they have been supplied, into ammonia, or into carbonic acid, and thus to afford them both warmth and nutriment.

The roots of this plant have a slightly bitter, mucilaginous taste, rather inclining to sweetness; the fruit is of a nearly similar flavour; but the young shoots are the most agreeable to the palate.

Asparagus is allowed to promote the appetite; and affords a delicious article of nourishment to the invalid and valetudinarian, who is not troubled with flatulency: on the other hand, when eaten plentifully it is attended with diuretic effects, and therefore a salutary food to those whose urinary passages are liable to obstructions, and a defective secretion of that fluid.

As a substitute for asparagus, the young buds of hops have been recommended, as they may be more easily procured, and are both grateful and wholesome.

Aspen-Tree. See Poplar.

Asperugo. See Bugloss, Catchweed, and Madwort.

Asperula. See Woodroof.

ASPHODEL, or King's Spear, the *Asphodelus*, L. is an exotic plant, of which there are five species; namely, four growing wild in the southern parts of Europe, and one only, the *Narthecium ossifragum*, or Lancashire Asphodel, a native of Britain. It thrives in turfy marshes, and flowers in July and August. See Withering's *Arrangement*, 339, and *Engl. Bot.* t. 535.

The best method of propagating this ornament to a garden, is, by dividing the roots in August, before they shoot their fresh green leaves; they may likewise be raised from seeds sown in August; and at the same time in the succeeding year, the plants produced from these may be transplanted into beds, where they will blossom in the second year. They should not be planted in small borders, among tender flowers, as they require considerable nourishment.

The Lancashire Asphodel is supposed to be very noxious to sheep; for, when necessitated to feed on it, from a poverty of pasture, they will indeed improve in flesh at first, yet they afterwards die with symptoms of a diseased liver. Horned cattle, however, eat it without any bad effect.

There are wonderful tales related of this plant by Pauli, Bartholini, and others: who call it *Gramen ossifragum*, from its supposed property of changing the bones of such animals as swallow it, into cartillage; and thus producing that singular disease in cattle, which in the human frame is, by nosologists, termed *mollities ossium*, or softness of the bones.

For the various purposes of economy, however, we recommend the culture of two species of this plant; namely,

1. The *Asphodelus luteus*, L. or the common Yellow Asphodel, which, according to LEMERY and VIGAT, produces an esculent root, abounding in farinaceous particles, easily extracted in boiling water: this mealy decoction, passed through a sieve, mixed with barley or rye-flour, and then baked, affords a palatable and most nourishing bread. Its stalks also, though naturally acrid, may be deprived of that property by boiling, and converted to a similar use.—Another writer on economy, Prof. BECKMANN, of Göttingen, informs us that, though this plant is a native of Sicily, it prospers, and abundantly propagates, in the open air of Germany. Its roots, by which it is produced, consist of long yellow knobs, so disposed that they all adhere to a larger one, serving as the basis of the whole. They are pulpy, mucilaginous, and balsamic, and a species of bread may likewise be prepared from their seeds.—SESTINI also remarks, in confirmation of the preceding facts, that the shoe-makers of Italy make of this root an excellent paste, for cementing the inner soles; and that it is preferable to the usual paste of those artisans, who consume considerable quantities of wheaten and other flour.

2. The *Asphodelus ramosus*, L. or Branching Asphodel, with naked stalks three feet high, and ensiform, cuneated, smooth leaves. It is a native of Germany, in many parts of which it grows in common meadows: its flowers are white, and of a stellated form. The pulpy root of this species was eaten by the ancients, with the addition of oil and salt; while its stalks, roasted under hot wood-ashes, afforded them, according to BECHSTEIN, a most delicious repast.

Asplenium trichomanoides. See MAIDEN-HAIR.

Asplenium scolopendrum. See HART'S TONGUE.

ASS, by naturalists, is classed as a species of horse, or *Equus.*

The tame, or domestic Ass, is an animal remarkable for his meekness, patience, and tranquillity. He submits with firmness to chastisement, is temperate in his food, and contents himself with the disagreeable herbage which other animals disdain to eat; but is more delicate with regard to his drink, never using water, unless it be perfectly pure. This animal is esteemed for his attachment, and, though generally used with severity and harshness, nay, often with cruelty, he is fond of his master, has a scent of him at a distance, and easily distinguishes him from other persons. Of all animals, the ass, perhaps, is capable of supporting the heaviest burthen, in proportion to his size: and, on account of his slow and regular pace, is particularly useful in journeying over uneven grounds, and mountainous countries.

The finest breed of asses was formerly met with in Egypt, but, at present, those reared in Spain are preferable. In the latter country, as well as in Italy, the inhabitants eat the flesh of asses with avidity. Their milk is of so thin a consistence, that it neither affords butter nor cheese, but is extremely agreeable to the tender stomachs of consumptive persons, and very wholesome for young children, when drank while warm from the animal: but it should be taken at least three or four times a day, half a pint at each time, and continued for several weeks or months, if any real benefit be expected from this simple diet.

The manner of preparing artificial asses milk, not inferior in its properties to the natural, is as follows: Take of eryngo-root, or sea-holly, and pearl barley, each half an ounce, liquorice-root three ounces, water two pounds, or one quart; boil it down over a gentle fire to one pint, then strain it, and add an equal quantity of new cow's milk.

ASSEMBLY, in general, signifies a meeting of several persons in the same place, and for a common purpose. Without entering into a history of the assemblies that were customary among the ancients, or those held by the moderns, for deliberating upon political, ecclesiastical, or civil affairs, we shall, in this place, only observe, that all public meetings, when conducted with a spirit of order and decorum, are highly conducive to polish the manners of a people. This good effect is obvious from assemblies instituted in provincial towns, for the purpose of either amusement or instruction, by which the manners of young persons, in particular, acquire a certain grace and dignity, seldom to be met with among those who spend their lives in small country towns, or solitary mansions.

But, on the other hand, it cannot be denied, that the frequent visiting of assemblies, theatres, &c. where a great number of persons, perhaps, afflicted with various chronic diseases, breathe and vitiate a common atmosphere, must be attended with pernicious effects, even to the most healthy.—See BALLS and MASQUERADES.

ASSIMILATION, in animal economy, is that hidden natural process by which living beings are enabled to convert such bodies as have a certain affinity to them, or at least after having undergone some preparation and change of their properties, into their own substance and nature. Hence every culinary process is conducted on chemical principles analogous to those on which the digestion of food appears to depend in the human stomach.—See CHYLE, DIGESTION, NUTRITION, SALIVA.

Assurance. See INSURANCE.

ASTHMA, is a spasmodic disease of the organs of respiration, attended with cough, difficulty of breathing, wheezing, &c.

There are two distinct species of this disorder, each of which requires a different treatment: 1. When it is attended with an accumulation and discharge of humours from the lungs, in which case it is called *humid asthma*; and 2. When the patient is not troubled with coughing, or at least has no expectoration, which is termed *dry asthma*. Yet these complaints seldom affect persons in early life, and then chiefly the male sex.

Asthma, in general, is distinguished by paroxysms, preceded by a sense of tightness in the chest, and in general occurs during the night. The patient cannot lie in an horizontal posture, without danger of suffocation; and, when seized, is immediately obliged to sit upright. After continuing for several hours in this state, he becomes easier; his breathing is less difficult and oppressed, the cough not so frequent, and an expectoration of mucus taking place, the paroxysm abates until the next night; but the symptoms continue in a greater or less degree, during the day, according to the particular state of the atmosphere, and other circumstances. The attack is sometimes induced by external heat, at others by cold; but in either case, their *sudden* accession will sufficiently distinguish the asthma from symptomatic shortness of breath. There is a greater probability of curing it in youth than at an advanced age. But, in the former case, it is often succeeded by a confirmed pulmonary consumption; and, after a long continuation, generally terminates, either in dropsy of the breast, or an aneurism of the heart or arterial system. A tremulous respiration, paralysms of the arms, and a diminution of the urinary secretion, are unfavourable symptoms.

This is one of the chronic diseases, which may continue for a considerable number of years. Sir John Floyer, when he published his celebrated treatise on this subject, had suffered under repeated paroxysms for almost thirty years. The usual treatment is, to bleed, during a fit, unless extreme weakness or old age should forbid the use of the lancet; to inject a purging clyster, containing a solution of asafœtida; and if the violence of the symptoms do not speedily abate, to apply a blistering plaster to the neck or breast. Previously to a fit, emetics have been found useful, especially when the stomach was loaded with crudities. In the intervals, *lac ammoniacum*, vinegar of squills, asafœtida pills, and other stimulating and deobstruent medicines, are usefully employed. Sir John declares, that a strong infusion of roasted coffee is the best remedy he ever experienced, to abate the paroxysms. The coffee must be of the best Moca, newly burnt, and made very strong, immediately after grinding. He orders an ounce to one dish, which is to be repeated after the short interval of a quarter or half an hour, and taken without milk or sugar. By the use of this remedy, he lived many years tolerably easy, under his asthmatic complaint. Dr. Percival also asserts, that he has employed it with great success.

In a violent paroxysm of asthma, from the effects of which there is imminent danger of suffocation, the administration of an emetic is sometimes advisable, as vomiting tends to produce immediate relief. This remedy, however, can only be resorted to with safety, under the following circumstances: 1. That there be no symptoms of inflammation discoverable; 2. That the humid matter in the pectoral organs be loose, and ready for expectoration: which may be ascertained by a free rattling of the throat; 3. When respiration itself is not extremely impeded; and 4. When the patient's strength is not too much exhausted.

On these conditions, an emetic may prove the only means of saving his life; though it may also accelerate the fatal catastrophe, especially if the breast be clogged with matter, and the patient possess not vigour and breath sufficient to support the operation of an emetic. Hence a judicious practitioner will, in such cases, not hesitate to direct a brisk dose, in order most speedily to produce the desired effect, and to save the constitution from being unnecessarily exhausted. But this illustration also evinces the importance of every step in the practice of physic; and that neither officious friends, nor mercenary pretenders, are the most proper persons, whose services can be useful on such or similar occasions. We, therefore, think it our duty to corroborate this proposition still farther, by exhibiting a concise view of those causes, from which that formidable disease may arise in different individuals. The principal of these are as follow:

I. Collections or congestions of blood in the lungs; from which there may not only arise the dry asthma, but likewise the SUFFOCATIVE CATARRH, which is, strictly, an acute disease, occasioned by an extravasation or effusion of blood into the cellular substance of the lungs, and of which we propose to treat in its proper place.

2. Congestions of serous and pituitous humours, arising gradually, and producing, in general, the humid asthma: but if this collection of humours take place suddenly, as is the case in inflammations of the chest, they are then attended with the suffocative catarrh.

3. Spasms in hypochondriacal and hysteric persons; which often lay the foundation of a dry, convulsive asthma.

4. Worms in the first passages.

5. Stones in the gall bladder; aneurisms; *polypi*, or concretions of grumous blood in the large vessels.

6. Asthma may likewise be a symptom of dropsy of the chest.

7. Scrophulous, rheumatic, gouty, psoric, and scorbutic acrimony—all may occasion the asthma, either in the lungs themselves, or by consent of parts.

8. Noxious vapours arising from the decomposition of lead, or arsenic; which generally cause a convulsive asthma.

9. The introduction of dust into the lungs, to which millers, masons, hatters, &c. are subject.

10. Tubercles in the lungs, from which arises the dry asthma.

11. The abuse of ardent spirits.

12. A weak digestion, attended with great flatulency.

13. Every thing that oppresses the vessels, such as an expansion of the uterus, obesity or preternatural fatness, aneurisms, fleshy and other tumors in the chest, a distended abdomen by dropsy, obstipations, &c.

14. General debility, by which respiration is frequently rendered difficult, without any other particular cause. This affection may be ascertained from the circumstance, when the patient ascends a number of steps with greater facility than he is able to descend, because the latter requires a greater degree of muscular effort than the former.

What a variety of causes do we here behold—many others being reserved, as too abstruse for *non-professional* readers; and who will be bold enough to pretend, that he has discovered a *specific* for the cure of asthma?

Beside the remedies already pointed out, as proper for the general treatment, we shall here briefly observe, that in the *periodical* asthma, infusions of bitter herbs, such as wormwood, lesser centaury, the blessed thistle, as well as gum ammoniac, vinegar and honey, acids in any form, nay, mixed with proportionate quantities of laudanum, have been used with the best success. The exercise of riding on horseback is indispensably necessary. Changes of weather are very sensibly felt by asthmatic persons, who, in general, cannot live with any comfort in the atmosphere of large cities, though some are to be found, who feel themselves better in an air replete with gross effluvia; and breathe with greater ease in a crowded room, where there is a fire and candles. A principal advantage, however, will be derived in this obstinate disorder, from a light and *frugal diet*, consisting of such animal food only as may be easily digested, and at the same time, avoiding all flatulent and heating substances, as well as liquors; for instance, wine, milk, turnips, cabbages, &c. not exposing the body to the influence of hot air, strong smells, offensive vapours, and the like. As a most excellent *diet-drink*, we can, from experience, recommend the use of toast and water, in which a few grains of nitre, or sal ammoniac, might be dissolved; or with the addition of a little pure vinegar. And, if any alterative medicine should become necessary, after the proper evacuations, by either bleeding and blistering between the shoulders, or, according to circumstances, by gentle laxatives, and nauseating doses of ipecacuanha (See APPETITE), we have found the following mixture frequently of great advantage:—Take oxymel of squills, and cinnamon water, two ounces of each, and pure spring water four ounces; two table-spoonfuls, each dose, every three or four hours.

Astragalus. See MILK VETCH.

ASTRINGENTS are those medicinal substances which act upon the simple elementary fibres, by contracting them, and increasing the force of cohesion, so as to relieve that degree of bodily debility, which depends on their deficient powers of contraction. This want of cohesion, being supposed to arise either from an aqueous consistence, or a deficiency of animal jelly, in the interstices of the fibres, it appears to follow, that substances affording much nourishment, and containing matter for the supply and condensation of that medium between the solids and fluids, in the greatest proportion, are likewise the most effectual astringents. Indeed, daily experience speaks in favour of this apparently well-founded conjecture. But as mankind seem, from the earliest ages, to have been dissatisfied with those simple and congenial substances, which beneficent Nature granted them, even in the most inhospitable regions; they have, by gradual steps, forsaken her path, and resorted to artificial means, which chance or credulity induced them to procure from distant climates. Thus strangely has man, in all *civilized* countries, suffered himself to be misled by prejudice; and, instead of investigating the true nature and uses of things at home, he went in quest of foreign auxiliaries, and frequently sacrificed the very life he was anxious to preserve.

In order to ascertain, with precision, when astringent remedies may be employed with safety and advantage, we shall reduce the subject to distinct propositions.

I. The cases in which it will become necessary to have recourse to astringents, are:

1. A general, and local, debility, or relaxation of the fibres: the former is relieved by the internal and external use of *tonics*; but the latter, chiefly by local applications, such as cold fomentations.

2. In a preternatural, and particularly a putrid disposition of the fluids.

3. In injuries of the vessels.

On the contrary.

II. The following circumstances and conditions prohibit the use of astringents:

1. A general rigidity of the frame, and tension of the solid parts.

2. Unusual heat of the body, unless it proceed from a general or partial debility, or a dissolution of the fluids.

3. Salutary and critical discharges, which take place by a spontaneous effort of nature.

4. The existence of some morbid matter in the body, the evacuation of which might thus be checked and prevented.—Hence it is attended with peculiar disadvantage and danger, to apply such remedies externally, as for instance, cold baths in rheumatic, gouty, erysipelatous and other affections, in which there is a natural disposition for expelling the morbific matter (or at least its residuum) by the pores of the skin. Thus the eating of astringent food would be pernicious, if the first passages be obstructed, or the person liable to habitual costiveness; though this rule is not without its exception, especially in putrid, bilious fevers, where astringents must frequently be combined with purgatives, to answer both intentions, and to support the sinking powers, without the loss of that time, which complete evacuation would necessarily require.

In order to enumerate those astringent remedies which, partly by our own experience, and partly by that of others, have been found the most efficacious, either externally or internally, we shall here alphabetically arrange them, and treat of their individual properties and effects, under their respective heads; viz. ALUM; BARK, the ANGUSTURA, HORSE CHESNUT, PERUVIAN and WHITE WILLOW; BILE OF ANIMALS; BUCK-BEAN or MARSH TREFOIL; CENTAURY THE LESSER; AVENS-ROOT; GENTIAN; WATER-HEMLOCK; IRON; MILFOIL; MINERAL ACIDS and WATERS; OAK; PICHURIM-BEANS; and simple WATER.

ASTROLOGY, a conjectural science, the professors of which pretend to judge of the effects and influence of the planets; and to foretell future events, by the situation and different aspects of the heavenly bodies. It is divided into two branches—natural and judiciary. To the former belongs the prediction of natural effects, such as the changes of the weather, winds, earthquakes, &c.: the latter is that in which misguided and superstitious persons attempt to foretell future events.

Judicial astrology is said to have been invented in Chaldea, and thence transmitted to the Egyptians, Greeks, and Romans. At Rome, the people were so infatuated with this fallacious science, that the astrologers, then called mathematicians, could never be suppressed, notwithstanding all the edicts of the Emperors to expel them from that city.

This superstition has prevailed even in modern ages; and, about a century ago, was in great repute in this country. Since that period, however, the minds of men having become more enlightened, that art, which owed its origin to the practices of knaves, on the credulity of the ignorant, is now universally exploded by the intelligent part of society. There are, however, still in the metropolis, several female impostors, who have acquired a degree of celebrity among their own sex, by the *accidental* fulfillment of some of their frivolous predictions.

The origin of so absurd a pursuit, may be ascribed chiefly to an almost general neglect of studying, in schools, those branches of natural science, which explain the phenomena taking place in the different kingdoms of nature; and to that singular eagerness which is obvious, not only among all uncivilized nations, but likewise among the lower classes of the most enlightened people, for acquiring a knowledge of *future* events, while they neglect their *present* welfare and safety.—See DIVINATION; NECROMANCY.

ASTRONOMY is considered as the most sublime of all the sciences, and implies a knowledge of the heavenly bodies, with regard to their respective magnitude, motions, distances, &c.; and of the natural causes by which these phenomena are produced. It is not improbable, that ADAM and his immediate progeny, the antediluvians, possessed a slight knowledge of astronomy. On the building of the tower of Babel, NOAH is supposed to have retired with his children born after the flood, to the north-eastern part of Asia, where his descendants peopled the vast empire of China; and this, in the opinion of Dr. LONG, accounts for the early cultivation of astronomy by the Chinese. Mr. BAILLY, who has taken great pains to investigate the progress of the Indians, is of opinion, that the first epoch of their astronomy commences with the conjunction of the sun and moon, which took place 3102 years before the Christian æra. Even the Americans, and especially the Mexicans, were not altogether destitute of astronomical knowledge. But the Chaldeans and Egyptians were the first nations that became, in this respect, conspicuous in ancient history; and it is doubtful, whether the Phœnicians acquired the rudiments of this science from the former, or the latter; though we are indebted to their enterprizing merchants, who first applied it to the useful and important purposes of navigation.

Its origin among the Greeks is unknown: HESIOD and HOMER were the earliest writers who mention astronomical facts; but the science was afterwards, though not considerably, improved by THALES, ANAXIMANDER, PYTHAGORAS, ARCHIMEDES, and HIPPARCHUS, who made the first specification of the fixed stars; and lastly, by PTOLEMY, whose erroneous system is now exploded.

Among the Arabs, who adopted the present arithmetical characters from the Indians, GEBER laid the foundation for our modern trigonometry; which MENELAUS, the Greek, about the year 90 after Christ, had ineffectually attempted to establish, in his three excellent books on spherics, even after that doctrine had been rendered more simple by the labours and improvements of PTOLEMY.

The Emperor FREDERIC II. of Germany, who was a great patron of the sciences, in 1230, also revived the study of astronomy in Europe. Thence arose JOHN HALIFAX, CLAVIUS, ROGER BACON, VITELLIO, and the indefatigable PURBACH, who died in 1461, when only thirty-eight years of age; he was succeeded by his celebrated pupli, REGIOMONTANUS, of JOHN MÜLLER, of Monteregio, who flourished at Nürnberg in the latter part of the fifteenth, and by JOHN WERNER in the beginning of the sixteenth century; till at length arose the justly celebrated NICOLAUS COPERNICUS, the greatest luminary that ever appeared on the shores of the Baltic, and who is undoubtedly the principal reformer of astronomical science. After having studied physic at Rome, and returned to his native country, at present called West Prussia, he began, in the year 1507, to doubt the accuracy of all other systems, except that of PYTHAGORAS. Endowed with a comprehensive and penetrating mind, a correct judgment, and inexhaustible powers of application, he could not fail to discover the truth of the hypothesis advanced by that sagacious Greek, "who placed the sun in the centre, and supposed all the planetary bodies, and the earth itself, to revolve around him."

Since that period, astronomy has been progressively cultivated by different nations, especially the Germans, Italians, French, and English. The principal characters, whose names will be transmitted to posterity, for their useful labours in the immense field of practical and theoretical astronomy, are nearly the following: TYCHO-BRAHE, the Portuguese, who spent a great part of his time in useless efforts of opposing the immutable system of COPERNICUS; CLAIRULT, D'ALEMBERT, LA CAILLE, and DE LALANDE, in France;—GALILEO, CASSINI, FONTANA, BOSCOVICH, BIANCHINI, FRISI, MANFREDI, ZANOTTI, and others, in Italy;—KEPLER, URSINUS, HEVELIUS, ROEMER, the two EULERS, MEYER, KAESTNER, LAMBERT, GRISCHOW, MILLER, BURJA, HEHL, BODE, ROESLER, FISCHER, RECKARD, RÜDIGER, SCHEIBEL, OLBERS, and more especially V. ZACH, the leader of German astronomers, who now resides at the new observatory, near Gotha;—WARGENTIN, BLINGENSTERN, MALLET, and PLANMAN, in Sweden;—and WRIGHT, NAPIER, BRIGGS, HORROX, NEWTON, FLAMSTEAD, HALLEY, POUND, HUYGENS, HOOK, BRADLEY, FERGUSON, GREGORY, MASKELYNE, and in a more eminent degree than any of his compatriots on the continent, the transcendant HERSCHEL, under the immediate patronage of his present MAJESTY, who, since the days of the PTOLEMYS, affords the most illustrious example of a truly philosophic monarch.

Of the latest and most popular publications on this subject, we shall state only the following: *A Compendious System of Astronomy*, by MARGARET BRYAN, 4to. 1l. 7s. 6d. boards; Leigh and Sotheby, 1797.—*The Study of Astronomy, adapted to the Capacities of Youth*, by J. STEDMAN, 12mo. pp. 154; 2s. 6d. Dilly, 1796.—*Practical Astronomy*, by A. EWING, 8vo. pp. 400; 5s. boards; Longman, 1798.—Lastly, a work of a more scientific character, is the Rev. S. VINCE'S *Complete System of Astronomy*, vol. 1. 4to. 1l. 4s. boards; Wingrave, 1797. The author excludes familiar explanations, moral reflections, and historical details; but has carefully examined whatever relates to the subject, and bestowed the greatest attention on the correctness of the tables; a circumstance of the first importance to a book of this nature.

Athamanta Libanon, L. See MOUNTAIN SPIGNEL.

Athletic ART. See GYMNASTIC EXERCISE.

ATHLETIC *Habit,* a term which implies a strong constitution of body. Among the ancients, it signified a robust and corpulent state, such as the *athletæ* endeavoured to acquire.

The athletic habit is considered as the highest point of health; yet such a state is equally precarious, and exposed to danger; for when the body is no longer capable of improvement, the next change must be for the reverse: hence "its most healthy condition closely borders on disease; and the seeds of distemper are planted in the very fulness or luxuriance of our fluids."

ATMOSPHERE, a term derived from the Greek words *vapour* and *sphere,* whence it has been generally applied, to signify that surrounding mass of air which consists of aqueous and other vapours, the electric and magnetic fluids, &c. but the altitude or extent of which has never been accurately ascertained.

Under the article AIR, p. 21, we have already mentioned the general properties of this surrounding medium; hence we shall here observe, by way of supplement, that according to the discoveries of modern chemists, though still opposed by Dr. PRIESTLEY, the atmosphere is not a simple, but a compound body. Pure air, or *oxygen,* is but a small part of its composition, while that of *azote,* or mephitic air, constitutes about three-fourths. The former is, on account of its more salutary properties, better adapted to the respiration of men and animals, than common atmospheric air; and though, by its powerful influence, it is eminently calculated to restore the life of creatures, when animation is accidentally suspended, so that the late Dr. INGENHOUZ has justly termed it *vital air*; yet it is not proper for long-continued respiration. Azote, or suffocative air, on the contrary, is unfit for supporting animal life, as it is absolutely irrespirable. Hence it must be obvious, that a greater or less proportion of this noxious ingredient in our atmosphere, arises from the innumerable processes of combustion, putrefaction, and respiration, whether by nature or art, in all large and populous cities. For this reason, *country-air* is so much preferable, that certain invalids, especially pthisical and asthmatic persons, are obliged to retire from towns to a purer, or, at least, less vitiated region. Hence also, it will be understood, that *sea-air* must be infinitely more conducive to support the most important process of life; as, by the constant agitation or commotion of the watery element, mephitic vapours are in a manner neutralized; though the azote enters into no combination with that fluid: upon a similar principle, it has been suggested (p. 23) to purify the foul air of pits and wells, before any person attempts to descend into them, by simply pouring in a few pailfuls of water, whether boiling or cold. By the same method also, the noxious vapours of old wine-casks, and other vessels or receptacles of corrupted air, may be effectually deprived of their pernicious, and often fatal, influence.

The third constituent part of the common atmosphere, viz. *fixed air,* or *carbonic acid gas,* naturally exists in so small a proportion, as to form only a hundredth part of the whole, and therefore deserves no particular account in this place, as we propose to treat of it under the article of BREWING.

Atrabilis. See Black BILE.

Atriplex. See ORACH and PURSLANE.

Atropa Belladona, L. See Deadly NIGHTSHADE.

ATTENUANTS, or attenuating medicines, in *humoral* pathology, are such as have a tendency to subtilize or resolve the humours into finer parts. And though this definition may not satisfy the plurality of modern pathologists, who account for almost every diseased action taking place in the human body, partly from the nervous influence—which is still more obscure—and partly from an accumulation or exhaustion of excitability (or predisposition); the former of which implies *direct* debility, and produces *sthenic* diseases; the latter originates from *indirect* debility, and generates *asthenic* disorders, according to the plausible theory of the ingenious Dr. JOHN BROWN; yet we shall attempt to lay down a few general propositions, respecting the *sensible* properties and effects of medicinal substances, when we arrive at the articles of HEALING-ART, and MEDICINES.

Attenuating, or inciding remedies, have long been, and are still, considered of very extensive utility in physic. They produce such a variety of effects, that it is necessary to be previously well acquainted with their different kinds, in order to choose and administer them with safety and advantage. At present, we shall content ourselves with stating the most simple and efficacious remedies which have, generally speaking, by practical physicians been allowed to produce the following effects:

I. Such as tend to cool and attenuate the fluids, when there prevails an inflammatory disposition in the system: namely, lemon-juice; common wood sorrel *(Oxalis acetosella,* L.); crystals of tartar; vinegar; nitre; sal ammoniac; cucumbers *(Cucumis sativus,* L.); less nettle *(Urtica urens,* L.); common house-leek *(Sempervivum tectorum,* L.); and butter-milk.

II. Those which possess the property of dissolving extravasated, stagnant, and coagulated blood:—German leopard's bane *(Arnica montana,* L.)

III. Attenuants of pituitous stagnations:—whey; sugar of milk; fixed air; Seltzer water; soap; couch, or quick-grass *(Triticum repens,* L.)

IV. With a view to resolve pituitous and tenacious obstructions in the breast:—hedge mustard *(Erysimum officinale,* L.); hyssop; liquorice-root; seneka; bitter milkwort *(Polygala amara,* L.); elecampane *(Inula Helenium,* L.); gum ammoniac; myrrh; galbanum.

V. To subtilize incrassated and viscid lymph:—antimony in various forms; sulphur; hemlock; foxglove; wolf's-bane, or monk's hood, &c. but we seriously advise those readers, who do not pretend to professional knowledge, never to make use of these plants, or of antimony, sulphur, and other metallic preparations, without having previously availed themselves of proper medical advice.

VI. To attenuate the stagnant and vitiated bilious matter in the intestines:—dandelion *(Leontodon taraxacum,* L.); wild succory *(Cichorium intybus,* L.); fumitory *(Fumaria*

(Fumaria officinalis, L.); sopewort *(Saponaria officin.* L); white horehound *Marrubium vulgare,* L.); soluble tartar *(Kali tartarisatum,* Lond.); honey; celandine *(Chelidonium majus,* L.); ivy-resin *(Resina hederæ helix,* L.); cherry-laurel water *(Aqua Laurocerasi,* L.); the two last-mentioned preparations, however, cannot be taken with safety in febrile and other states of the body, and ought therefore to be prescribed by medical men.

VII. Remedies tending to resolve stagnant wilk in women:—The leaves of the alder-tree *(Betula Alnus,* L.) and vitriolated tartar.

VIII. Medicines for dissolving and expelling calculous concretions:—See STONE; GRAVEL; LITHONTRIPTICS.

Of all these medical substances, (excepting such as have already been described), we propose to give, in the sequel of the alphabet, a more particular and satisfactory account.

AUCTION, a public sale for the disposal of household goods, books, plate, landed estates, &c. By this method of sale, the highest bidder is always the purchaser. The origin of sales by auction is very ancient; for among the Romans it was performed by the public crier *sub hasta,* i. e. under a spear erected on that occasion; and the goods purchased, were delivered by a magistrate. In the year 1777, the auctioneers residing in London were subjected to a tax of 20s. per annum, and a duty of 6d. was paid for every 20s. arising by sale of furniture, fixtures, &c. and of 3d. in the pound by the sale of freehold or copy-hold estates. In 1787, the duty was increased to 10d. in the pound on furniture, &c. and to 6d. in the pound on real property.

As this method of selling goods appears to be rather founded on the principle of *competition,* than that of *choice,* it certainly deserves every encouragement in a commercial country: hence it were only to be wished, that government might be enabled totally to suppress those *mock-auctioneers* who infest several streets of the metropolis, and use every artifice to entice and deceive the unwary, especially the harmless visitors from the country.

AUTUMN is computed the third season of the year; and with respect to the animal body, is doubtless the most unhealthy.—Hence TERTULLIAN calls it "the test of valetudinarians;" but the ancient Germans, though acquainted with the three other seasons, appear to have been uninfluenced by the severity of autumn; as they had no particular term to express it, unless we admit the word "harvest," in modern German, "*Herbst,*" as equivalent to what they at present call "*Erndte,*" or the gathering in the fruits of the earth.

The circumstances which render this season the least conducive to a healthy state of the body, are the following: 1. Because the vegetable kingdom, with very few exceptions, returns the salubrious leaves of trees and plants to their primitive, maternal earth, where they undergo spontaneous decomposition. This decay, or process of putrefaction, produces a remarkable change in that surrounding medium which supports animal life, and the relative purity of which, determines the most important function of the system, namely, that of respiration. 2. As, by the greater pressure and humidity of the atmosphere, the pores of the skin are so affected that they become unable to perform their office of exhalation, with the same facility as in winter and summer; it follows that perspirable matter, or at least, its grosser particles, will in autumn be liable to remain on the surface, in a state inclining to putrefaction, and to be re-absorbed, to the great detriment of the human or animal body. Hence arise bilious and putrid fevers, with a long train of other complaints, according to the constitution and particular circumstances of the individual.

Parental Nature, however, has amply provided the means of obviating such disastrous effects. With this intention she has given us a great variety of sub-acid fruit, and acescent vegetables, which, at that season, attain to their perfection, and are eminently qualified to counteract the putrid disposition of the fluids. To assist her in this benevolent intention, we ought to choose an appropriate diet; and, at the same time, defend the surface of the body with a proper dress, which is warm, light, and sufficiently porous, in order to admit the evaporation of perspirable volatile humours.

Notwithstanding all the objections made by *theorists*, against the use of Flannel, worn next the skin, we venture to pronounce it the most beneficial covering; provided the conditions and exceptions we shall state under that article, be duly attended to. But to see the fashionable females of the metropolis, as well as in the country, at all seasons of the year, dressed in muslin, cotton, and other light stuffs, scarcely sufficient to protect them against a sudden blast of wind—such deviations from the rules of prudence, and *real* economy, may, indeed, deserve the lash of the Roman satyrist, who speaks of the bitter complaints of Proserpine, in chilly autumn, but they cannot be corrected by Reason, till the shrine of that whimsical idol 'Fashion,' be shaken, and its ground-work demolished, by a more dignified system of Education.—See that article.

AVARICE, is that restless and insatiable desire of accumulating riches, which is the surest indication of a contracted and, generally, depraved mind.

As the governing passions of the *brute creation* are lust and hunger, the predominant desires of the *human species* appear to be power and money: it has accordingly been asserted, that the origin from which all the misfortunes and calamities of mankind have arisen, are *ambition* and *avarice*.

When a person doats upon money, merely for the sake of possessing it, without any regard to the good purposes of life, which it might serve; or to the new enjoyments that may be procured by it; without any regard to the benefit of his neighbour, or to any advantage accruing from it to himself—such a being may justly be called a *miser* of the *first* class. His greatest happiness, apparently, consists in the contemplation of money; an idol whom he even condescends to worship, while he removes him in triumph from one part of his dwelling to another.

The next, and *second* class of misers, comprehends those singular persons who are eager to amass large sums of money, enjoy but a *temporary* pleasure in its possession, and at the same time have some particular object in view, the execution of which constitutes the *acmé* of their wishes. If this object happen to be centered in a trifling and despicable pursuit, it must be ascribed to a narrow and sorbid education; by which the foundation was laid for an inconsistent and irrational turn of temper, for a servile attention to the lowest mercenary employments. Sometimes, however, to the honour of mankind, such persons, while practising an almost criminal frugality, speculate on the means of benefiting their fellow-creatures. Of this description was GODINOT, a French clergyman at Rheims, who refused to relieve apparent wretchedness; and, by the skilful management of his vineyard, had the good fortune to acquire large sums of money. His fellow-citizens detested him, and the populace every where received him with contempt. Nevertheless, he continued his usual simplicity of life, and steadily adhered to the most rigid system of economy. Mean-while, this good man had long felt the wants of the industrious poor in that city, particularly in having no water but what they were obliged to purchase at a considerable price. At length, he laid out his princely fortune in the building of an aqueduct, by which he rendered the poor more useful and lasting service than if he had distributed his whole income in charity, every day at his door: and thus he proved himself the true benefactor of society, whose name deserves to be transmitted to posterity.

The *third*, and perhaps most culpable class of avaricious persons, are those *literary* misers, who incessantly apply themselves to study, and eagerly seize upon every useful fact or discovery, without ever intending to impart it to others. If the acquisition and propagation of knowledge were dependent on these persons, who in many other respects resemble the monks of the dark ages, a speedy return of barbarism would be the necessary consequence. A similar idea, perhaps, struck the didactic POPE, when he thus concisely expressed himself in the following lines:

"Be niggards of advice on no pretence;
"For the *worst* avarice is that of sense."

Lastly, it deserves to be remarked that avarice, in general, has a tendency to stifle every spark of sympathy and generosity in the human breast: to affect also the different functions of the body, in a manner not unlike that we have described under the head ANXIETY; and that even savage nations, for instance, the Canadians, bestow the greatest care on the susceptible minds of their children, to prevent the growth of that vile and corrosive passion.

Avena. See OATS.

AVENS, or GUM, L. a genus of plants comprehending eleven species, of which, however, only two are natives of Britain, viz.

1. COMMON AVENS; the *Geum urbanum*, L. (also called great-flowered Avens, or Herb Bennet); grows in woods, and about shady hedges; produces yellow flowers from May to August, and is represented by WITHERING, 477. The stalks of this useful plant attain a height of two feet. In spring, its woody root possesses the aromatic flavour of cloves.

In medicine, the root of the common avens has lately been employed with singular efficacy in the cure of obstinate agues. A tincture made of it, in the proportion of four ounces of the root, digested with a quart of brandy, in a sand heat, and given to the quantity of half an ounce, or more, two, three or four times, has seldom failed to cure *intermittents,* where the Peruvian bark had proved ineffectual. Others give it with equal success in decoction, powder, or electuary, in doses from one scruple to a drachm or more, several times a day—provided that the first passages be previously evacuated by proper laxatives. This root has also afforded an excellent remedy in several chronic disorders, as a general strengthener and astringent: indeed, the experiments made by BUCHHAVE shew, that its antiseptic powder is superior to that of the best foreign bark.

As an object of rural and domestic economy, this plant deserves some attention. Sheep are extremely fond of its herbage; which may likewise, when young, be used for culinary purposes, and especially in the form of salad. If the common avens-root be collected, split, and dried, a portion of it secured in a bag, and hung in a cask of beer, it is affirmed (in the Transactions of the Swedish Academy), that this simple expedient will prevent it from turning sour. —On this subject, we refer to the article BREWING.

In the useful arts, this root has likewise been employed in the process of tanning leather. DAMBOURNEY informs us, that the stalks and leaves of the plant have been used with advantage for dyeing wool of a permanent *olive-brown* colour, when previously steeped in a solution of bismuth.

2. WATER AVENS, *Geum rivale,* L. grows in the North of England, Scotland, Wales, &c. in meadows and groves of a humid soil; its pale red flowers appear in June and July. We find it delineated in *Engl. Bot.* t. 106, and by WITHERING, 478.—The herb and root of this species, though of inferior efficacy, have also been employed in medicine, as well as by tanners.

AVOIRDUPOIS is the name of the weight adopted for the larger or coarser commodities, such as groceries, hops, cheese, wool, lead, &c. It is distinguished from *Troy-weight,* which was formerly used in England for every purpose, and is still retained for weighing gold, silver, and jewels, for compounding medicines, for experiments in natural philosophy, and for comparing different weights with each other. The former contains sixteen, and the latter only twelve ounces to the pound.—Bakers, who live in country places, manufacture their bread by avoirdupois-weight, but those who carry on business in corporation-towns, are obliged to make it by troy-weight. Apothecaries purchase their drugs, if wholesale, by the former, but retail them out by the latter.—See WEIGHTS, and MEASURES.

Aversion. See ANTIPATHY.

Azalea procumbens, L. See TRAILING ROSE-BAY.

Azote. See ATMOSPHERE.

B.

BACHELOR, a word of doubtful origin; though, in the political economy of nations, when a plurality of persons apparently glory in that appellation, its practice cannot fail to be attended with effects detrimental to the State, and frequently disgraceful to the individual.

We do not, however, include in this description, the *Bachelors of Arts*, those in the Livery Companies, nor even the ancient *Knight-Bachelors* of England, whose title did not descend to posterity; but we more particularly allude to those *unmarried* men, who pretend to live in a state of stoic celibacy, and are, for the most part, generally, either avaricious misers, or unprincipled spendthrifts. That there are many exceptions to this odious character, cannot be denied; yet, in a maritime country, where a great proportion of active men devote themselves to a seafaring life, there ought to be public disgrace attached to those, who cannot assign the most substantial reasons for their choice of celibacy.

Even the ancient Greeks were so fully persuaded of the pernicious influence of professed bachelors, on the population and morals of their countrymen, that, by the laws of Lycurgus, they were branded with infamy, excluded from all offices civil and military, as well as from national games and public spectacles. Farther, such persons were compelled to appear at certain festivals, where they were exposed to public derision, and led round the market-place: in this degraded situation, the fair sex conducted them to the altars, and obliged them to make *amende honorable*, by submitting to blows and lashes, at discretion. The women, not satisfied with this specimen of passive obedience, forced them to sing certain songs teeming with satire, and deprecating a state of life which Nature had never designed.

The Roman laws, also, were not more favourable to their toleration; and the vigilant censors frequently imposed arbitrary fines on old bachelors. According to Dionysius, the historian, there existed in Rome an ancient edict, by which all persons of full age were *obliged* to marry. But the most remarkable law enacted against them, was that made in the reign of the Emperor Augustus, by which they were rendered incapable of enjoying the benefit either of legacies or inheritance by will, unless from their near relations. This limitation, Plutarch justly observes, induced many bachelors to marry; not so much with the view of having heirs to their own estates, as to qualify themselves to inherit those of others.

Thus it clearly appears that, from the early ages, the most civilized nations expressed a just abhorrence of a life which is more calculated to promote the narrow grovelling views of the individual, who prefers it to the most sacred and honourable station in society, than to benefit that circle of the community, of which he is frequently a *consuming*, and worthless member.

From a conviction, that the *plurality* of bachelors are not conducive to the welfare and interest of the State, the British Legislature has already imposed a small fine upon their celibacy, by an additional duty on servants. But, as the annual payment of so moderate a tax affects only the middle, and less opulent, classes of society, we venture to suggest a remedy, perhaps more effectual, for checking this species of degeneracy. Let us suppose a young man of rank and fortune, devoting himself to every kind of dissipation, and squandering an income that would maintain half a parish; we can see no reason why he should not, at a certain age, be compelled to assign his motives for *not* marrying. If these should be found unsatisfactory, there would be no injustice done to such a character, by employing him in distant climates, either in a naval or military capacity, where he might contribute to the safety and protection of the empire.

BACON, the flesh of swine, salted, dried, and, generally, smoked in a chimney. As the history and customs relative to this savoury dish, would furnish but little instruction, we shall proceed to state the most approved methods of preparing it, both in England and on the Continent.

Somersetshire-Bacon, the most esteemed in this country, may be made any time during the last three months of the year. When a hog is killed for bacon, the sides are laid in large wooden troughs, and sprinkled all over with *bay salt*: thus they are left for twenty-four hours, to drain away the blood and the superfluous juices. After this first preparation, they should be taken out, wiped very dry, and the drainings thrown away. Next, some fresh bay salt, well heated in a large iron frying-pan, is to be rubbed over the meat, until it has absorbed a sufficient quantity, and this friction repeated four successive days, while the meat is turned only every other day. If large hogs are killed, the flitches should be kept in brine for three weeks, and, during that period, turned *ten* times, then taken out, and thoroughly dried in the usual manner; for, unless they be thus managed, it is impossible to preserve them in a sweet state, nor will their flavour be equal to those properly cured.

As the preservation of the salt used in this process, when carried on to a great extent, may be an object of economy, we shall state the following method of recovering the saline matter contained in these *drainings*, or in any other *brine*, whether from herrings, beef, or pork: it was communicated to us by a friend, who had seen it practised on the Continent, where culinary salt is sold at a considerable price. He first added such a quantity of boiling water to the brine, or drainings, as was sufficient to dissolve all the particles of the salt. This solution he then placed in either an iron or earthen vessel, over a fire, which, by boiling, forced all the feculent and animal particles to the top, so that they were carefully removed by a perforated ladle. After the liquid had become clear, it was set aside for twenty-four hours, in a cool place, that the colouring matter might subside. But, as the combination it had formed with the boiled liquor was very tenacious, he contrived two different ways of separating it: 1. A solution of alum in water, one pint to an ounce of that substance, was gradually dropt into the cold liquor, in the proportion of a table-spoonful of the former to every gallon of the latter; and the whole allowed to stand for several hours; or, 2. If time and circumstances would permit, he filtered the liquor by means of long flannel slips, cut longitudinally by the web, but previously soaked in another strong and perfectly clear solution of salt: these slips were so immersed into the coloured fluid, that the projecting external end reached another vessel, which had been placed much lower than that containing the brine, or drainings. When these particulars were properly attended to, the absorbed liquor became almost colourless, and pellucid. Having thus procured a clear liquid solution, nothing more was required than to evaporate it to dryness, in order to re-produce the salt in its original granulated form. We have faithfully reported the process, which may be imitated without difficulty, and at little or no expence. In our opinion, the second method of discharging the colour is preferable; as, by this, no alum will be required, which only contaminates the salt.

Smoked Bacon, one of the most relished, but almost indigestible, dishes of the Germans, is prepared in a manner similar to that adopted in the curing of the celebrated *Westphalia Hams*. For the latter, however, animals that have been well fed, and allowed to roam at pleasure in the extensive moorlands of that province, are generally selected. And if credit be due to the report lately spread in London, by a native of Westphalia, that those delicious hams, so much esteemed in this country, are the produce of hogs which frequently die of obesity, and were sold for half price to the ill-reputed German skinners (*schinder*), who export them to Hamburgh or Holland, we cannot, in justice to our friends, recommend them for their salubrity. The manner of obtaining them is nearly as follows: after the hams have been properly salted, rubbed, and wiped with dry cloths, in order to absorb all the impure juices, the cavities of the joints, as well as the bones themselves, are carefully covered with a mixture consisting of two parts of the best salt, perfectly dried, and one part of black pepper, coarsely powdered. As soon as this operation is performed, the hams are, on the same day, suspended in a chimney, where no other but wood fire is burnt, and which is usually increased during the first three days. The time of fumigation is regulated by the size of the meat, and generally extends from three to six months.

Although we have here given directions for preparing ham as well as bacon, we by no means wish to insinuate, that either of them affords a wholesome article of nutriment. Such delicacies should be eaten only by the robust, the laborious, and healthy, in great moderation, and seldom. Under these conditions, they may occasionally afford proper exercise to a sound stomach, when taken in small quantities, in the morning, or previous to a long journey in cold and serene weather. On the contrary, in weak and languid habits, these artificial preparations, not unlike all indurated animal fat, are most difficult of digestion, and therefore improper. As they easily turn rancid in the stomach, or are perhaps already tainted by long suspension, persons afflicted with hectic fevers, or liable to the heart-burn, ought entirely to abstain from their use.

BADGER, an animal resembling in its external characters, both a dog and a hog: it is now seldom met with in England, though formerly it afforded great sport. The unequal length of its legs has introduced the expression *badger-legged.* Its flesh has a taste similar to that of wild hogs, and is much esteemed in Italy, France, and Germany. Indeed, these carnivorous quadrupeds are themselves so very fond of pork, that a piece of such meat, placed over their burrow, is the surest inducement to their appetite, and will in a few minutes entice them above ground.

Besides affording a nutritive, but not easily digestible food, the skin of the badger makes excellent knapsacks, and covers for travelling-trunks, saddles, &c. because it is impervious to rain, and stands in need of no additional preparation for rendering it *water-proof*; a process we shall describe under the article LEATHER. The hairs or bristles of this animal are used for painters' brushes; and its penetrating fat answers a variety of useful purposes: for it is not only employed as an ingredient in injections for relieving nephritic complaints, or such as arise from obstructions in the urinary passages, but likewise externally, in rheumatic affections, especially those called *Sciatica,* and for the cure of sore and chapped nipples in young mothers. For paralytic dieases of the aged, it is asserted, that the hairy skin of this creature, when worn next the surface of the body, has been of eminent service, by stimulating the inert, cutaneous, and muscular vessels into action: and there can be no reasonable objection against giving this simple remedy a fair trial for a few weeks, where medicines generally are ineffectual.

The crafty horse-dealers also employ the badger's fat in a singular manner, which involves a degree of fraud and cruelty. They pull out the hair in several places, and anoint the bare spots with this fat; when the hair grows again, it is of a white or grey colour, so as to give the horse a pyebald appearance, which probably inhances its value.

BAG, in commerce, is a term for a sack, or pouch, containing a certain quantity or weight of some particular commodity. Thus a bag of almonds is about three hundred pounds; of aniseed, from three to four hundred pounds weight, &c. The best material for making compact and durable bags, is hempen cloth, previously steeped in a strong decoction of oak-bark, or tanner's waste.

Bag, in farriery, signifies a medicated external application, made with a view to recover a horse's appetite. For this purpose, one ounce of asafœtida, with an equal quantity of powdered savin, are mixed together, put into a bag, and tied to the bit. Meanwhile the horse should be kept bridled for two hours, several times a-day, and as soon as the bag is removed, the animal will begin to eat. We have stated this piece of advice on the authority of the *Encyclopædia Britannica*; though we are inclined to think that such superficial applications will seldom avail.—See FARRIERY.

BAGNIO, a term adopted from the Italian, and signifying a *bath*: in English, it denotes a house for bathing, sweating, and cleansing the body; but sometimes also for worse purposes.

The substances used for heating *bagnios* are various; such as bricks, stones, &c. managed in different ways, and in several vessels and utensils, according to the choice or fancy of the proprietor. The effect generally expected from resorting to such places, is an immoderate degree of perspiration, occasioned by artificial heat: this cannot fail to open the pores; to attenuate and dissolve the humours; to dissipate all the superfluous particles; and eventually to heat and dry the whole body.—Hence this practice cannot be proper for persons of a choleric, thin, and spare habit, nor for those subject to periodical discharges.

In rheumatic and paralytic diseases, great benefit has sometimes been derived from a cautious use of the bagnio. For whatever complaint it be resorted to, care must be taken that neither the bowels nor stomach be distended, which might be the case in the former, by obstructions or costiveness; in the latter, after a plentiful repast. Besides, the heat of a bagnio should always be accommodated to the strength and peculiar condition of the patient; for if immoderate, it will be attended with effects very detrimental to the whole frame, the least of which are pustules, tumors, and obstructions of the surface of the body.

BAITING, a practice derived from the barbarous ages, and one of those amusements which degrade the human character. Thus we hear of the baiting of bulls, or bears, by mastiffs, or bull-dogs with short noses, that they may take a firmer hold of their opponents.

Whatever may be urged in justification of *bull-baiting*, this criminal species of game deserves to be equally condemned, both on account of its moral and physical tendency. It was first introduced in England as an amusement, in the reign of King John, about the year 1209, and has been continued to the present day, though the spirit of barbarism has apparently been succeeded by that of refinement.

Scarcely an animal is now killed without being previously baited; because it is pretended, that the chasing and exercise of the poor brutes, render their flesh more tender and digestible. Although this assertion be partly true, yet, on the other hand, such meat is much disposed to putrefaction, and unless consumed in time, cannot fail to be hurtful to those who possess a weak and indolent stomach. Independently of this consideration, the inhuman practice of bull-baiting ought not to be connived at by magistrates, especially about the metropolis, where butchers are suffered to sport with our lives, by *furiously* driving cattle in the open day through crowded streets, and particularly in what is called the *City Road*, where no person on foot can pass and re-pass with safety.

BAKER, a person whose business is that of baking and selling bread. The origin of this useful profession is not ascertained, though it is certain that the first public bakers appeared in the East, and passed from Greece to Italy, about the year of Rome 583. Prior to that period, every house-wife baked her own bread.

In ancient Rome bakers enjoyed great privileges, and formed a kind of *College*, from which neither they nor their children were permitted to withdraw; holding all their effects in common, and not being allowed to dispose of any part of them. To preserve honour and honesty in the College of bakers, they were expressly prohibited all connection with comedians and gladiators; while they were exempt from guardianships and other offices, which might interfere with their occupations. By the English statutes, no person exercising the mysteries or sciences of baking, brewing, surgery, or writing, shall be deemed a handicraft. Since the year 1155, the first-mentioned artisans have formed a brotherhood in this country; though the white bakers were not incorporated till 1407, and the brown bakers until 1621.

We regret that so wealthy and respectable a body of men as our modern bakers, give us frequent cause of complaint, either by the unwholesome quality, or the deficient weight of bread; an article which loudly calls for the wisdom and unremitting vigilance of the legislature. No new office in any department of police appears to be so necessary, and likely to be productive of such essential advantages to the whole metropolis, as that of "Inspector of Bread."

BAKING is the art of converting flour, or other farinaceous substances, into bread.—As we propose to treat more fully on this subject, under the article Bread, we shall here only explain what relates to a proper method of preparing it.

In domestic life, the baking of bread is frequently mismanaged; which may be ascribed to the following circumstances. Some women do not use a just proportion and temperature of water, so that the bread turns out either pasty, or too firm and heavy; others do not use a proper quantity or quality of leaven, or barm, whence the bread acquires either an unpleasant bitterish taste, or the dough cannot rise, and consequently becomes tough and viscid; again, others do not understand the due degree of heat required in the oven, so that it will be either under, or overbaked. All these particulars deserve to be attended to, otherwise a bad and unwholesome bread will be produced. To survey, therefore, the whole process, which is one of the most complicated in chemistry, we shall here communicate a few general directions.

1. The flour, whether made of wheat, or rye (which two are doubtless the best and most wholesome species of grain), ought not to be used immediately on coming from the mill, as in a fresh state it is too moist for making good and palatable bread; but it should be kept in a dry place for several weeks, stirred every day in summer, and at least every other day in colder seasons, till it has acquired such a consistence, as renders it loose and yielding between the fingers.

2. As the dough will not rise, without giving it a proper leaven or barm, this ought to be a principal object in families, as well as to bakers. If leaven be employed, it should on the preceding evening be deprived of its hard crust, and dissolved with a little, scarcely milk-warm, water; then carefully mixed with about a third part of the flour to be used for baking, and kneaded into a soft dough, by adding more *tepid* water. A small quantity of flour is put on the top; and, thus prepared, it will be necessary to cover the trough with blankets, and suffer it to stand in a mo-

a moderately warm place till the following morning, that it may rise and duly ferment. The remaining two-thirds of the flour must then be added, with a proportionate quantity of luke-warm water, and the whole kneaded into such an elastic dough as will draw into strings without breaking, and not adhere to the fingers. In this state it is again covered, and allowed to stand (while preparations are making in the oven), and not disturbed till it begins gently to rise, when it should be formed into loaves.

3. A proper degree of heat is an essential requisite to the baking process. When the inner arch of the oven appears entirely white, it is generally considered as sufficiently heated. But this being a fallacious criterion, we would recommend the following: Place a handful of flour before the aperture of the oven, and if it turn of a brown colour, the heat is then nearly of the degree required; but if it become black, or remain white, in the former case the fire must be considerably reduced; and in the latter, more fuel must be added. Lastly, all parts of the oven should be uniformly heated; and though we cannot enter into farther particulars, yet the attentive house-wife will easily, from her own observations, regulate the degree of heat, with the same effect as it might be done by Mr. Wedgewood's *Pyrometer* for the baking of earthen-ware.

Remark.—Musty flour, when baked into bread, is not only extremely detrimental to health, but it also imparts a bitter and nauseous taste. When such flour is not too strongly tainted, it may be corrected by first kneading it with leaven or sweet barm, then making large holes with a wooden cylinder in the dough, filling up the cavities with flour that is perfectly sweet, suffering it to remain in this preparatory state till the next morning, then removing the dry flour carefully with long spoons or similar implements, and afterwards converting the dough into bread, with the addition of such flour as is not musty. By this simple process, the flour first mixed up will be sweetened, but that which has been left over night in the dough, is said to become so corrupted, that it can be given only to animals.

It has frequently been attempted, and not without success, to bake good, wholesome bread, with little or no barm. In consequence of a dispute between the brewers and bakers of Dublin, concerning the price of yeast, in the year 1770, the latter carried the point, by making their bread without it. As this process, however, could not be readily imitated in domestic life, we shall here state *a method of raising a bushel of flour with a tea-spoonful of barm*; first practised by James Stone. It is as follows: Put a bushel of flour into the kneading-trough or trendle; take about three-quarters of a pint of warm water, and thoroughly mix with it a spoonful of thick, sweet barm; then make a hole in the middle of the flour, large enough to contain two gallons of water; pour in your small quantity, and stir it with a stick, so that it may, with some of the flour combining with it, acquire the consistence of batter for pudding; then strew a little dry flour over it, and let it stand for about one hour, when you will find the small portion so raised, that it will break through the dry flour scattered over it. After this, pour in another quart of warm water, while you are stirring in more flour, till it become as thick as before; then again shake dry flour over it, and leave it for two hours longer—repeat the same method about twice more, always suffering it somewhat longer to be at rest, and the bread will become as light as if a pint of barm had been used. Nor does this method require above a quarter of an hour more time than the usual way of baking; and the author of it asserts, that his bread has *never* been heavy nor bitter.

With respect to the difference of seasons, J. Stone directs that, in summer, the water should be used blood-warm; in winter, or cold frosty weather, as hot as the hand can bear it without pain; while in the former season the dough should be covered up very warm, and strewed over with dry flour every time tepid water is added, to keep in the heat: after using six or eight quarts of such water to every bushel of flour, in the gradual manner before described, it will be found that the whole body of flour which is mixed with the warm water, by means of a single tea-spoonful of barm, is brought into considerable agitation, so that it waxes or ferments without difficulty.—See also Yeast.

Having already, on a former occasion, alluded to the adulterations practised by bakers, a subject we propose to resume under the head of Bread, we shall conclude this article with a quotation in point, abridged from the XXIVth volume of the *Monthly Review*, for January 1751.—"Heaven gives us good corn, but our bakers, it is said, have sought out many inventions. *Alum* is no proper ingredient in the composition of this great support of life; and *lime* must be still worse:—we tamely permit a few ignorant mechanics to mingle poison with our daily food, and *gradually* to ruin and destroy our HEALTH, the greatest blessing of all; under the idle pretence of humouring a ridiculons prejudice, in favour of a fashionable but artificial hue, in opposition to the sweet, wholesome, natural complexion of the corn!"

Baking-Stove (portable.) See Stove.

BALANCE, one of the six simple powers in mechanics, principally used for determining the equality or difference of weights in such bodies as are liable to this computation.

There are two kinds of weights principally used at present; the ancient, or the Roman steel-yard, and the modern, which consists of a lever or beam suspended exactly in the middle, having scales or basons attached to each extremity. If the arms of the balance be of equal length, and similar weights placed in the scale, the balance will consequently be in *equilibrio*. But if one of the arms be in length to the other as ten to nine, the balance may still be so constructed, that both the arms with their scales shall equiponderate. This vile contrivance, however, justly deserves to be branded with infamy; because a weight of nine pounds put into the longer arm, will counterpoise another of ten pounds placed in the shorter one; but the fraud may be instantly discovered, by shifting the weight from the one scale to the other, in which case the balance will lose its equipoise.

BALDNESS, a defect of hair chiefly on the fore part of the head.

Among the pre-disposing causes of baldness, excessive indulgence in sensual gratifications, and particularly in wine and spirits, is perhaps the principal; though old age usually causes the loss of hair even in the most regular livers. In ancient Rome, the term *calvus*, or bald-pate, was frequently used by way of reproach for this deficiency, which then was in great disrepute.

In modern times, divers arts are practised to conceal a bald head, and a variety of preparations are offered to the credulous, in the daily prints, with the solemn promise that they are infallibly calculated to make the hair grow again. As these advertisers are, comparatively speaking, harmless chemical compounders, we do not wish to treat them with severity, so long as they confine their medicines to *external* applications.

In our opinion, baldness is incurable, when it arises from general debility, or an asthenic state of the system; but where it takes place in consequence of acute diseases, or during a tedious recovery from malignant fevers, the growth of the hair has frequently been accelerated by the following liniment: take of the expressed juice of burdock-root, virgin-honey, and proof-spirits, of each one ounce, mix them together, and anoint the barren part of the head several times a day—at the same time taking care to cover it with soft flannel, in order to promote perspiration.

BALL, in a general sense, is a round or spherical body, whether formed by nature or art. Thus the terraqueous globe which we inhabit, appears to have assumed that form, in consequence of the revolutions round its own axis, not unlike a mass of clay, when turned in a circular direction.

But as the term "Ball" is used in a great variety of significations, we can here introduce only those few, where it is applied to economical purposes: hence we shall take no notice of fire-balls, light-balls, smoke-balls, stink-balls, sky-balls, water-balls, land-balls, &c.

BALLS, in the polished circles of society, are those nocturnal assemblies devoted chiefly to the entertainment of dancing. Whether public or private, the institution of balls appears to have been originally intended for the conjoint purposes of promoting health, by the exercise there mingled with mirth and social conversation, as well as for the refinement of manners, or what is more properly termed *good breeding*.—(See that article.)

In large and populous cities, however, these excellent purposes are often in a great measure defeated; partly by a deviation from the genuine principle on which balls were first introduced, under the sanction of wise governments, and partly by connecting this amusement with collateral objects, such as suppers, masquerades, card-parties, &c.

Consistently with our plan, we beg leave to observe only, that morality and health would be better consulted, if all public balls and masquerades were limitted to a certain number of visitors—excluding every female who ventures to appear without a proper friend or relation; and, upon the whole, by adopting those excellent regulations which already subsist in the city of Bath, where *decorum* or good breeding is the "order of the night."

Horse-balls, among farriers, are given only for the purpose of conveying into the stomach of that nice and noble animal, the more disagreeable drugs which it would not swallow in drenches. Hence these balls should not exceed the size of a pullet's egg, and be dipped in sweet oil previous to their administration, that they may pass down the throat with greater facility. But as some horses have a straight gullet, and are remarkably averse to this method of taking medicine, it would be preferable to give them drenches, or mixtures with bran, or other mashes.—See FARRIERY.

Portable-balls for removing spots from clothes in general, may be thus prepared: take fuller's-earth perfectly dried, so that it crumbles into a powder; moisten it with the clear juice of lemons, and add a small quantity of pure pearl-ashes; then work and knead the whole carefully together, till it acquires the consistence of a thick elastic paste; form it into convenient small balls, and expose them to the heat of the sun, in which they ought to be completely dried. In this state, they are fit for use in the manner as follows: First, moisten the spot on your clothes with water, then rub it with the ball just described, and suffer it again to dry in the sun; after having washed the spot with pure water, it will entirely disappear.

Ballota. See HOREHOUND.

Balls (fuel). See COAL-BALLS.

BALM *(Common)*, or *Melissa officinalis*, L. is an exotic plant, though much cultivated by our gardeners, on account of its pleasant aromatic smell, resembling that of the lemon, and its fragrant, though roughish taste. It grows wild in the southern parts of Europe, and flowers with us in the months of June and July. See WOODVILLE'S *Med. Bot.* pl. 147.

Formerly, the balm was held in very high estimation: PARACELSUS, HOFFMANN, and BOERHAAVE, probably biassed by the opinions of the Arabian physicians, believed to find in it a medicine of uncommon efficacy; nay, the first of these, with his fanatical followers, supposed it to possess virtues, by which human life could be prolonged beyond the usual period, and they vainly promised themselves a complete renovation of man. In modern times, however, the properties of this agreeable plant are better understood: it yields, by distillation, a small proportion of an essential oil, of a yellowish colour, and a very grateful smell. A few drops of this oil, diluted in a glass of simple water; or strong infusions of the young shoots, drank as tea, and continued for several weeks, or months, have proved of service to nervous and hypochondriacal patients, of a lax and debilitated habit.—Either of these liquid preparations, when slightly acidulated with lemon juice, acquire a fine reddish colour, and may be taken with advantage in dry, parching fevers, as well as in cases of distressing flatulency, attended with eructations, where the first passages have previously been opened.

BALM *(Reddish Bastard)*, or *Melittis melissophyllum*, L. is an indigenous plant, growing wild in the West of England, in woods and about hedges; it produces purple, reddish, and spotted flowers from May to July. See WITHERING, 539, and CURTIS, pl. 6.

BALM *(Purple* and *White)*, or *Melittis grandiflora*, L. another species of the balm, likewise indigenous to this country, and flowering in

May: it is delineated in *English Botany*, t. 636; and in CURT. Lond. *fasc.* 6. t. 39.

We have mentioned both these native plants, not on account of their diurotic properties, for which they were once celebrated, but the former, as affording fine aromatic flowers, which are eagerly visited by bees; and the latter, as being a fine ornament to a flower-garden.

BALSAM, or Native Balsam, an oily-resinous fluid, oozing out of certain plants, either spontaneously, or by incision.

There are a variety of balsams, denominated according to the substances from which they are obtained, such as the CANADA, COPAIVA, GILEAD, PERU, TOLU, &c. of which we shall give an account under their respective heads.

BALSAMICS, a term used in an indefinite manner, but literally signifying *mitigating* substances, and often applied to medicines of very different qualities, such as emollients, detergents, restoratives, &c. It appears to be a general character of balsamics, that they are hot and pungent, like the natural balsams and gums; while their internal use tends to increase the vital heat of the system.—Hence they are commonly administered in those complaints which originate from a diseased action, or a defective state of the interior organs; and as they can only be introduced to those parts by the stomach and the circulation of the fluids, it will be easily understood that these slowly operating medicines cannot be productive of great effects, unless continued for a considerable time.

BALSAMINE, or Touch-me-not, the *Impatiens noli-tangere*, L. is one of the poisonous native plants, growing in moist and shady places, especially in several parts of Westmoreland, Lancashire, Yorkshire, and Wales: it is most abundant on the banks of cold brooks running through wood-lands, sheltered under willows and alder-trees. Its stalks are about eighteen inches high, and its yellow flowers appear in August.—See WITHERING, 263.

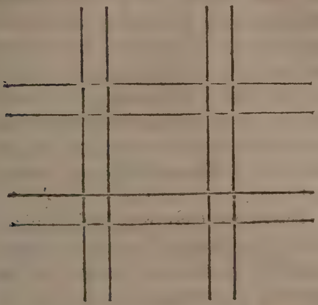
The capsules of this plant, when touched by the hand, burst and throw out their seeds with velocity; whence it has received it name.

Balsamine Seeds possess the deleterious property of producing violent purging, when swallowed inadvertently, especially by children; and inevitable death, when taken to any extent. Dr. UNZER asserts, that the bread baked in an oven which had been heated with the dry stalks of this plant, poisoned and nearly destroyed a whole family.

In dyeing, the leaves and flowers of the balsamine, according to M. BECHSTEIN, impart to wool a beautiful yellow colour.

BAMBOE HABIT, an invention of the Chinese, by the use of which a person unskilled in the art of swimming may easily keep himself above water. The Chinese merchants, when going on a voyage, always provide themselves with this simple apparatus, to save their lives, in cases of danger from shipwreck. It is constructed by placing four bamboes horizontally, two before and two behind the body of each person, so that they project about twenty-eight inches: these are crossed on each side by two others, and the whole properly secured, leaving an intermediate space for the body. When thus formed, the person in danger slips it over his head, and ties it securely to the waist; by which simple means he cannot possibly sink.

Its figure is here subjoined.



BANDAGE, in surgery, a fillet, or roller, used in dressing and binding up wounds, restraining dangerous bleedings, and in joining fractured or dislocated bones.

The modern and more enlightened surgeons have, in some of the most important operations, relinquished the use of *tight* bandages, from a conviction of their tendency to do more harm than good. Thus it is certain, that the most expeditious cures of broken limbs, have generally been effected without any bandages; yet, as there is a necessity of keeping the injured limb in a steady posture, we shall expatiate on this subject under the head of FRACTURES.—See also LIGATURES, and TOURNIQUET.

BANDY-LEGS, a vernacular expression applied to distorted or crooked legs. In some cases this is a natural defect in the birth, though it may more frequently be ascribed to an improper treatment of infants, by *indolent* or *officious* nurses. The former will sometimes suffer an infant, scarcely twelve months old, to stand for hours on its legs, while confined in a chair, or an absurd machinery contrived for walking: the latter are too impatient to give early specimens of a child's vigour, and daily try experiments with its tender legs, before they are able to sustain the weight of the body.

When an infant is born with bandy-legs, the timely and judicious use of the bandage may, by imperceptible degrees, correct this defect; but it requires more patience and perseverance than people in general are able or disposed to bestow. Hence we cannot suppress a remark made by the ingenious LEVRET, that this species of neglect is attended with more important consequences to the female than the male sex: for, as deformities of the lower extremities are very frequently connected with similar mal-conformations of those bones which form the waist, we may hence account for the repeated abortions in many mothers who pay the strictest attention to diet, and every other circumstance, during the period of gestation.

This unfortunate deformity, however, cannot be easily remedied after the child has arrived at a certain age; and we believe all attempts would be fruitless, and even hurtful, after the sixth or seventh year: yet there are instances on record, where Nature, unassisted by art, has occasionally performed a cure. Dr. UNZER relates the case of a young man, who was born and reared with legs so distorted, that he was obliged to walk on the sides of his feet and heels; but during his apprenticeship with a taylor, sitting continually with crossed legs, he remarked that his lower extremities began gradually to recover their natural direction, and that his ancles in particular spontaneously returned to their proper position. He at length escaped from his master, entered on the list of warriors, and thus gave the most convincing proof of the soundness of his limbs.

BANE-BERRIES, the production of the HERB-CHRISTOPHER, or *Actæa spicata*, L. a native plant, which is in a high degree poisonous, though very rare, and to be met with chiefly in the north-western extremity of Yorkshire, in the vicinity of Malham Cove, Clapham, Askrig, and on the lower part of Ingleborough-hill. Its favourite places of growth are shady groves; its stalks attain to the height of eighteen inches, and it produces flowers in May and June. See WITHERING, 483.

Although some foreign writers assert that this plant does not possess the deleterious properties which are attributed to it by LINNÆUS, yet we have reason to believe that its great astringency must be highly detrimental to cattle.

In dyeing, bane-berries yield, on boiling them with alum, an excellent black colour, which, in a concentrated state, may be substituted for a cheap writing-ink. M. VON CRELL informs us, in the eleventh volume of his *Chemical Discoveries*, p. 118, in German, that one of his correspondents, M. THIELBEIN, obtained from the *red* berries of the Herb-Christopher, a colour not inferior to that extracted from *cochineal*; a fact, if corroborated by farther experiments, of great importance to dyers. The latter of these writers says, that after boiling those berries with cream of tartar, he heightened the dye with a solution of tin, in aqua fortis; by which process he produced a beautiful and uncommonly permanent colour.

BANK, in commerce, signifies a common repository, where persons consent to keep their money: it is also applied to certain societies or communities, who take charge of the money of others, either for the purpose of accumulating it by interest, or preserving it in safety.

The first institution of banks took place in Italy, where the Lombard Jews kept benches in market-places, for the exchange of money and bills.

There are two principal kinds of banks; either *public*, consisting of a society of monied men, who, being duly incorporated according to law, agree to deposit a considerable fund, or joint stock, to be employed for their use; by lending money upon good security, buying and selling bullion, discounting bills of exchange, &c. or *private*, which are established by individuals, or co-partners, who deal in the same way as the former, upon their own stock and credit.

The greatest bank of circulation in Europe, or perhaps in the world, is that of England. The Company was incorporated by an act of parliament, in the fifth and sixth years of WILLIAM and MARY. Dividends of the profits are made half yearly, of which public notice is given, when those who have occasion for their money, may readily receive it; but private individuals are permitted to continue their funds, if they think proper, and may have their interest added to the principal.

The Company of the Bank of England is under the superintendance of a Governor, Deputy-governor, and twenty-four Directors, who are annually elected by the general court, in a manner similar to that of the East India Company.

The stability of the Bank of England

land is considered as equal to that of the British Government; for, before its creditors can sustain any injury, all that it has advanced to the public must be lost.

At Edinburgh, there are two public banks; the one, called the Bank of Scotland, was established by act of parliament in 1695; the other, denominated the Royal Bank, was instituted by charter, in 1727.

Private banking companies have also, within these thirty years, been formed in almost every considerable town in Great Britain; their purchases and payments of all kinds are made by notes, and thus the country business is in a great degree carried on by *paper currency*. It is almost generally believed, that the community at large has derived considerable benefit from this artificial method of increasing the *circulating medium*: a proposition, the truth or fallacy of which it would not be easy to demonstrate.

There is another kind of Banks, which are instituted wholly upon the public account, and are called *Banks of Deposit*: their nature is not generally understood; but their object is to reform the currency which may at any time be worn, clipped, or otherwise reduced below its standard value. Such were the banks of Venice, Genoa, Amsterdam, Hamburgh, &c. when originally established; the last in particular, being always obliged to pay in good money, according to the standard of the State. As the cash of such banks was more valuable than the common currency of the country, it necessarily bore an *agio*, or an additional per centage, in proportion as the currency was supposed to be more or less depreciated. Thus the *agio* of the bank of Hamburgh, which is said to vary from fourteen to twenty per cent., constitutes the supposed difference between the standard money of the State, and the clipt, worn, and debased currency poured in from the neighbouring countries.

BANK-FENCE, in rural economy, signifies the inclosure of ground with an artificial bank. In places where flat stones cannot be procured, the most durable and advantageous method of fencing in arable or pasture lands, is with turf or green sods, about five or six inches thick; the foundation five feet wide; the middle filled up with earth; the top about three feet broad, and planted with proper shrubs or dwarf-wood. As every agriculturist is acquainted with the manner of constructing such fences, we shall only remark, that they are in many respects preferable to the common hedges; because the latter, with their ditches (if a computation were made throughout the British Empire) cover an almost incredible quantity of soil, while they neither afford sufficient shelter for cattle, nor can the herbage growing contiguous to them, be compared to that generally produced on the *sloping* sides of banks, where nettles and other aquatic weeds would not obstruct the vegetation of the more useful plants. It is, however, to be regretted, that manual labour in this country is at present so very expensive, that few farmers, excepting those who hoard up their grain, and wait for the *maximum*, or highest price, are either inclined or able, to defray the first and unavoidable expence connected with the system of *bank-fencing*.

A subject of such extensive importance, we humbly conceive, is entitled to every attention from a wise and economical legislature, or at least deserves to be conducted on similar principles, and with the same patriotic spirit, as has lately been displayed in the different schemes of inland navigation.

BANKS *of Rivers*, are those natural boundaries within which every stream is confined, according to the magnitude and velocity of its current. But as the course of rivers is frequently rapid and irregular, taking different directions, and often turning at acute angles, extensive inundations, especially in high spring tides, necessarily happen from the overflowing of their banks. Hence it is of the utmost importance to every inhabitant in the vicinity of rivers, to possess some knowledge of the proper method of forming embankments, for the prevention of floods.

Although we cannot, consistently with our limits, attempt a full mathematical analysis, yet we shall lay down a few general hints, and maxims, by which the reader may be guided in the practical view of this subject.

1. The principal point to be ascertained, is the *elevation*, or the heights necessary to be given to such banks. This must be regulated by the additional quantity of water which, according to former experience, the river brings down during its freshes; and likewise by the distance, at which the artificial bank is to be constructed, from the natural boundary of the stream. On this important point, mistaken economy frequently defeats its own purpose. If, therefore, the embankment is to be raised at some distance from the natural banks of the river, both a comparatively smaller height and base will be required; the saving will be in the duplicate proportion of the former, and the works will be likewise the more durable, nearly in the same ratio; because, by enlarging the additional bed given to the swollen river, its velocity and power of ruining the works are, likewise, accordingly diminished. Unless, therefore, the freshes of the stream be loaded with fine sand, which might decompose the turf, the embankment should always be undertaken at a considerable distance from the edge of a river. By placing the artificial bank at half the breadth of the stream, from its natural banks, its channel will thus be nearly doubled, and the detached space, in general, afford excellent pasturage.

2. The next circumstance to be attended to, is, that the river will *rise higher*, when embanked, than it did at the time when it was suffered to overflow; and hence the difficulty of ascertaining to what height it may rise, from the greatest swell which has been observed in its former floods. For this reason, the utmost rise in some gorge, where the river could not extend farther, should be accurately marked, as far as can be remembered by the oldest inhabitants. Now the increased section in this place should be measured; and, as the water rises in a much greater proportion than the section, the latter must be increased nearly in the same proportion as the gorge already mentioned. Those who neglect this method of regulating the proper height of the embankment, by the greatest swell that has in former floods been observed in the plain, are in danger of constructing their banks too low, and

consequently rendering them totally useless.

3. The whole embankment should, as much as possible, be conducted in an *uniform line*, and by the concurrence of the proprietors of *both* banks; because the general effect to be aimed at, consists in rendering the course of the stream straighter than it was before. All bends should be made less abrupt, by keeping the embankment farther from the river in all convex lines of the natural bank, and approaching to it nearer, where the latter is concave.—Thus the action of the waters on the embankment will be considerably diminished, and the duration of the work insured. On the same principles, we ought to proceed in fencing rivulets, or brooks, which empty themselves into a larger river; and whatever bends are given at its mouth to the two lines of embankment, they should always be made less acute than those of the natural brook; at the same time an opportunity should be taken, of reducing the angle of this transverse brook, or, in other words, of conducting it with a more gentle flexion into the main river.

4. Particular care should be taken, to cover the *outside* of the dyke with compact pieces of turf, or green sods, closely united. For if it admits the water, there is great danger of drenching the interior and more porous part of the wall, while the statical pressure of this fluid body tends to burst the bank on the land side; and thus the labour of months or years may be suddenly destroyed. Hence too great attention can not be bestowed on making and keeping it perfectly tight; so that the whole be one continued fine turf, and every bare spot must without delay be carefully covered with firm and fresh sods: nor should the rat and mice-holes be neglected.

Lastly, it deserves to be remarked, that a dry earthen bank, not firmly conjoined by grass-roots, will scarcely maintain itself against the pressure of the water, with a slope of forty-five degrees, while a canal conveying a moderate stream cannot be supported, even with such a declivity. Those banks, however, the base of which is as four to three of their height, will stand without danger in a moist soil: and this is not only the slope usually given them, but also observed in the spontaneous operations of Nature, in the channels which she forms in conducting rills and rivulets through the higher and steeper grounds. This natural form possesses both mechanical and mathematical properties, which justly claim the admiration of those who adopt her beneficent hints and maxims.

BANKS *of the Sea*, are those inequalities or elevations of the ground or bottom of the ocean, that may be compared to ridges or hills, with which the land is more or less intersected. Sea-banks sometimes project above the surface of the water, or at least leave this element so shallow, as to prevent a vessel from remaining afloat.

Sand-banks are very common in the North and Baltic Seas, so that navigators are obliged constantly to use the plummet and compass, to discover their distance and exact situation. As, however, these elevations frequently endanger the lives of our brave mariners, we have inserted this article, not with a view of intimidating those naval heroes, but for the information of persons whose business obliges them to cross the seas before mentioned, that they may provide themselves with an apparatus by no means expensive, and described under the head of BAMBOE-HABIT.

BANKRUPT, an appellation given to a person whose bank or stock is exhausted: the word is derived from the French, *banqueroute*, which signifies a breaking or failing in affairs of fortune.—From the description given of a bankrupt in our statute-books, he may be defined, "a trader who secretes himself, or does certain other acts tending to defraud his creditors."

The present system of bankrupt-laws is calculated for the benefit of commerce, and founded on the principles of humanity and justice. Hence they confer some privileges not only on the creditors, but also on the bankrupt or debtor himself; for, by taking into consideration the sudden and unavoidable accidents to which a person engaged in trade is liable, they not only grant personal liberty, but likewise pecuniary assistance, to men in this unfortunate situation; on condition that they surrender their whole estate, to be divided among their creditors. The benefit of the bankrupt-laws, however, are allowed to none but *actual traders*, as these are in general the only persons subject to accidental losses, and to an inability of discharging their debts without any fault of their own. But, when other individuals contract debts, the law renders them subject to the consequences of their own indiscretion.

By the statutes of this country, a man makes himself a bankrupt in consequence of the following acts:—1. By departing from the realm, with intent to defraud his creditors; 2. By leaving his house with intent to secrete himself for the same purpose; 3. Remaining in his house so as not to be accessible to his creditors; 4. Procuring or suffering himself willingly to be arrested, outlawed, or imprisoned, without a just and lawful reason; 5. Causing his money or effects to be sequestrated by any legal process; 6. Making any fraudulent conveyance to a friend, which is an act of the same suspicious nature as the last; 7. Procuring any protection to screen his person from arrests, though not entitled to that privilege by an act of parliament; 8. Endeavouring, by any petition to the King, or by a bill against any creditors, to compel them to take less than their just debts, or to procrastinate the time of payment; 9. Lying in prison for more than two months upon arrest, or other detention for debt, without finding bail; 10. Escaping from prison after an arrest for a just debt of one hundred pounds and upwards; 11. Neglecting to make satisfaction for any just debt to the amount of one hundred pounds, within two months after service of legal process for such debt, upon any trader enjoying the privilege of parliament.

Sir JOHN HOLT maintained, that a man's removing his goods privately, to prevent their being seized in execution, was no act of bankruptcy; as the statutes mention only fraudulent gifts to third persons, and causing them to be seized by sham-process, in order to defraud creditors. It has also been expressly determined, that a banker's stopping, or refusing payment, is not an act of bankruptcy;

because there may be good reasons for such conduct, as a suspicion of forgery, &c. If, in consequence of such refusal, he is arrested, and puts in bail, it is still no act of bankruptcy; but, if he goes to prison, and remains there two months, then, and not before, he becomes a bankrupt.

The consequences resulting from the unfortunate situation of a bankrupt, will be concisely stated under the article COMMISSION OF BANKRUPTCY.

BARBEL, in ichthyology, a genus of fresh-water fishes, comprising thirty-one species, which are principally distinguished by the number of rays in the vent-fin: their general characters are, a toothless mouth; three rays in the gills; a smooth and white body; and the belly-fins have frequently nine rays. The following ten are the most remarkable species: 1. The CARP; 2. The BARBEL (of which we have here subjoined a more particular account); 3. The TENCH; 4. The GUDGEON; 5. The BREAM; 6. The ROACH; 7. The DACE; 8. The CHUB; 9. The BLEAK; and 10. The GOLDEN FISH;—for a description of which we refer to the order of the alphabet.

The Barbel, or *Barbus*, is one of the coarsest fresh-water fish, and therefore eaten almost exclusively by the industrious poor, who boil it with bacon, to render it more palatable. Its roe is not wholesome, and ought therefore to be thrown away, as the eating of it is frequently attended with nausea, vomiting, purging, &c.—The natural history of this fish has escaped the attention of the ancients, though is sufficiently curious.

Barbels resemble pike in their general shape, the head excepted; for the upper jaw of the former is more projecting, and they are also provided with four dependent fibres or rays in the gills, with which, while dexterously playing, they allure their prey, consisting of insects and small fishes. Their dorsal fin is armed with a remarkably strong and sharp spine, serving them as means of defence or attack, and with which they frequently cut the nets, or when incautiously handled, inflict severe wounds on their captors.

In size, the barbel rarely exceeds the length of three feet, and weighs from twelve to eighteen, or twenty-five pounds. Its most frequent places of abode are the sides of hollow banks, in calm and deep waters. In the months of May and June, it deposits its spawn on the stones lining the beds of deep rivers, and between which, as well as poles, roots of trees, &c. barbels harbour during winter, in a compact and social state. Not unlike swine, they dig and excavate the soft banks with their noses, are fond of animal carcasses (particularly of human flesh, according to C. P. FUNKE, a reputed German naturalist), and become exceedingly fat by living on the refuse of flax steeped in stagnant waters. Hence we may also account for their unpalatable, and, perhaps, unwholesome flesh. They are so tame, that they may be easily caught by the hand; though we do not suggest so dangerous a method of taking them.—For the particulars relative to the method of angling for barbel, we refer to the article CARP.

BARBERRIES: See BERBERRIES.

BARBLES, or **BARBS**, in farriery, are those small excrescences frequently appearing under the tongue of horses, as well as black cattle;

cattle: they are known by two paps, which may be discovered by drawing the tongue aside. Few animals arrive at a considerable age, without being sometimes troubled with this complaint, which seldom proves hurtful, unless the part affected become inflamed by neglect, and the acrimonious humours there collected should corrode the tongue, and produce such a degree of pain, as to prevent the animal from taking its proper food.

The method of curing this distemper, simply consists in cutting the excrescence close off with a sharp pair of scissars, or a knife, washing the wound several times a day with brandy, or port-wine and vinegar, taking care, however, that no hard food but fresh grass, green herbs, and mashes, be given for several days, till the raw part be healed.

In those cases where black cattle are subject to a species of barbs, which grow quickly, and hang in the form of fleshy pimples under the tongue, they ought first to be clipt off, as before stated, then properly chafed with garlic and common salt beaten together, and the mouth afterwards gently washed and rubbed with soft linen, dipt in lukewarm wine, or brandy and water.

But if cows or bullocks happen to lose their appetite, without any external marks of barbles, M. Chomel, in his *Family Dictionary* (See p. 126 of our work), recommends the juice of garlic, or onions, mixed up with sallad-oil, to be introduced into the nostrils, every morning: this simple method, it is asserted, will restore the natural craving for food.

BARILLA, or BARILHA, is properly, the Spanish name of a plant cultivated for its ashes, from which the purest mineral alkali is obtained; but likewise signifies that particular sort of vegetable alkali which is principally imported from Spain.

There are four plants cultivated by the Spaniards for this useful purpose, namely, the *Barilla, Gazul, Goza*, and *Salicor*. But, as this account appears to be defective, we shall first present the reader with a list of those native vegetables from which good barilla has been extracted in Britain; and next give a description of the most expeditious and profitable method of preparing this valuable material, for the various processes of washing, bleaching, &c.

Among the British plants, from which barilla or mineral alkali may be obtained, we shall at present enumerate the following, and then describe them in their alphabetical places:

1. Two species of the *Salsola*, L. or Salt-wort.
2. Two species of the *Salicornia*, L. or Glass-wort, and Samphire.
3. The *Zostera marina*, L. or Glass-wreck.
4. Two species of the *Triglochin*, L. or Arrow-Grass.
5. The *Chenopodium album*, and *maritimum*, L. or White and Sea Goose-Foot.
6. The *Atriplex portulacoides*, and *littoralis*, L. or Sea-Purslane, and Grass-Orach.
7. The *Plantago maritima*, L. or Sea Plantain.
8. The *Tamarix gallica*, L. or French Tamarisk.
9. The *Eryngium maritimum*, L. or Sea Holly.
10. The *Sedum Telephium*, L. or Orpine Stonecrop, or Livelong.

11. The *Dipsacus fullonum*, L. or Manured TEASEL; and

12. All the species of the *Cynara* and *Carduus*, L. or the ARTICHOKE and THISTLE, when cultivated either on the sea-shore, or in any soil irrigated with sea-water.

Barilla, as an article of trade, ought to possess the following properties: it should be firm, hard, and heavy, though porous; dry, and sounding on percussion; of a blueish colour, and impart, on breaking it, a flavour slightly resembling that of the violet. By these criteria, it may be easily distinguished from pot-ash, though it would be difficult to procure a barilla consisting purely of mineral alkali; as the very best sort of the former generally contains a small proportion of common salt. According to the experiments made by Mr. KIRWAN, and published in the first volume of the *Transactions of the Royal Irish Academy*, in 1789, the barilla exported from Spain, contains carbonic acid, carbon, lime, clay, and silicious earth; but such as is very pure, also contains both common and Glauber's salt, and water. From the small quantity of carbonic acid discoverable in Spanish barilla, he concludes that its mineral alkali is for the most part combined with it in a pure or caustic state; and that its blueish colour must be ascribed to the matter of carbon: in a similar way, he attributes the green or blue colour of pot-ash to its combination with magnesia.

This important article of commerce is, in proportion to its degree of purity and strength, classed according to the following places, from which it is imported: 1. The barilla made at Alexandria; 2. That from Alicant; 3. Carthagena; and 4. Bourde, or Smyrna.

Various methods and schemes have, in this country, excited the ingenuity of speculative men, in the production of this valuable substance, for which large sums are annually paid at foreign markets. Those of our readers, who apply their attention to experiments of this useful nature, will, perhaps, be gratified by the following specification of Mr. JAMES KING'S patent for his new-invented *British barilla*, granted in 1780. As his exclusive privilege is now expired, we shall communicate the process nearly in the patentee's own words. He first takes a quantity of ashes obtained from burning the loppings or branches of ash-wood, oak, beech, elm, alder, and any other kind of green wood and bramble, in the proportion of one-fourth; and a similar quantity of ashes obtained by burning the green vegetables, known by the name of fern, brecon, bean and pea-straw, and whin-ashes; also common field and highway thistles; the stalks of rape and mustard seed; and the bent, or rushes, that grow by the sea-shore. One half of the ingredients being thus procured, they are then passed through a fine sieve, placed on a boarded floor, and carefully mixed with a similar quantity (making the other half) of soap-boilers' waste ashes, which must be intimately blended together with a shovel. Next, he adds one hundred weight of quick-lime to twelve times that quantity of the other materials, and likewise intermixes them thoroughly. After this preparation, the whole is put into large square iron pans, and a sufficient quantity of sea-water is

poured

poured on it to dissolve the lime, ashes, &c. while the mass is stirred with an iron rake, to effect a more minute intermixture. A coal fire is now lighted under the pans, and kept briskly burning forty-eight hours, without intermission; at the same time, the pans are continually supplied with sea-water, in order to impregnate these materials with a greater degree of the saline quality, till they acquire a proper consistence for calcination in a melting furnace, known by the name of *calcar*. This apparatus is constructed in the usual manner, except that there is a wall above the grate-room, to separate the fire from the materials laid upon the bottom. An intense degree of heat is used in this calcar, by means of which the saline mass boiled in the pan is completely dissolved, and afterwards kept in a state of fusion for one hour, during which time, the volatile part is expelled, and a fixed alkaline salt remains: this, being cooled in iron pans, produces our British barilla, resembling that imported from Spain. Mr. KING also declares, in the preamble to his patent, that this new chemical compound is calculated to serve as a substitute for manufacturing crown and broad window-glass, and also bottles, as well as for making soap and alum to much greater advantage, than any other material hitherto used in the production of those commodities.

BARING of Trees, in horticulture, is the removing of the earth from the roots of those which are planted in a dry soil. This operation should be carefully performed in autumn, without injuring the roots, around the trunk, so that the winter rains and snow-waters may penetrate deeper in the ground, which, towards spring, should be covered up again with manure; because, at that season, the frequent night-frosts might otherwise prove destructive to the tree.

BARK, in the dissection of plants, is the exterior coat of trees, corresponding to the skin of animals. As these are furnished with a cellular membrane covering all the fleshy parts, and usually replete with white granulated fat, which can be liquified only by heat; so are plants surrounded with a bark abounding with oily juices, by means of which, Nature has rendered them inaccessible to cold; because the spiculæ of the ice are prevented from fixing and freezing the fluids, which circulate through the vessels. Hence it is, that evergreens continue their verdure at all seasons of the year, because their bark contains an unusual proportion of oil, more than is dissipated by the heat of the sun.

The bark of plants is liable to peculiar diseases, as well as to be preyed upon by insects, which frequently prove destructive to the tree. One of its most common enemies is the *bark worm*, which infests and perforates its substance; and unless the parts affected be cautiously removed by the knife, and the superficial wounds plastered over with a mixture of wax and turpentine, the stem will in process of time become cankered, stunted in its growth, and ultimately fall a sacrifice to the disease.

M. BUFFON has ascertained, by repeated experiments, that trees stripped of their bark the whole length of the stems, do not live longer than three or four years.

It deserves, however, to be remarked, that, when thus deprived of the whole bark, and suffered to die gradually, they afford a more compact, heavy, and more durable timber, than if they had been felled in their healthy state. The reason of this improvement is obvious, as those oily and astringent fluids, which are secreted for the uniform nourishment of the bark, are absorbed and deposited on the fibres of the wood, which, during the progressive dissolution of vegetable life, acquire what Nature had provided for the supply of the external integuments. Yet there is one disadvantage arising from the privation of the bark, perhaps tantamount to the additional value of the timber, namely, that the farther increase, or growth of the tree, is for three or four years effectually checked.

The *barking of trees* ought, in our climate, to be performed in spring, from about the middle of April to that of May; because at that time the circulating sap facilitates this operation, which, in dry seasons is not only attended with additional labour, but the bark also will be of inferior value.

With respect to the *extent* of stripping the oak-bark from trees, a wide difference of opinion appears to prevail. Some owners of large tracts of wood, and great admirers of timber, cautiously prohibit the removal of the bark nearer than *six* inches to the ground; about which spot they suppose the tree to be felled: while others enjoin it to be done as near the ground as possible, provided that in this operation there be no part of the root laid bare. Mr. S. HAYES, the author of an excellent "*Practical Treatise on Planting*," price 7s. published in 1796, inclines to the latter opinion; and adds, that the advocates for the former method would, on more accurate investigation, save themselves much unnecessary trouble, to little purpose, if not to their considerable injury.

The inner and more delicate part of the bark, especially that of the ash and lime trees, was used by the ancients, for writing and communicating their sublime ideas to posterity, prior to the invention of paper.

In economy, as well as in many of the practical arts, the utility of different barks is very great and extensive; for instance, that of the oak for tanning leather, and manuring the soil; the Peruvian, cinnamon, quassia, willow-bark, &c. in medicine; and for culinary uses; that of the alder and walnut trees in dyeing; and others again for a variety of purposes, such as the bark of the cork tree, &c. &c. Without detailing the particular and curious processes adopted by foreign nations, for rendering the barks of various trees essentially useful, we shall briefly state, that the Japanese make their beautiful paper of the bark obtained from a species of the mulberry tree, called *morus*; the natives of Otaheite manufacture their cloth of the same tree, as well as the bread-fruit and the cocoa trees; the Russians and Poles produce their shoes worn by the peasantry, twist ropes, and form a variety of other useful articles, of the inner bark of the lime tree; the Germans have, for the last twenty years, converted the bark of the common black and white mulberry trees into excellent PAPER.—An analytical account of the last mentioned article, interspersed with many new and curious facts, we propose to give in the sequel.

BARLEY, or *Hordeum*, L. one of the most useful culmiferous plants, producing mealy and saccharine grains, which are principally used for malting and brewing beer. As the different species and varieties of barley are but imperfectly described in English botanical books, we shall here attempt to give a more satisfactory account, and also state, in a summary manner, the native places and qualities of the various sorts.

1. The *Hordeum distichum (s. æstivum)*, L. or SUMMER BARLEY. It bears flat ears, divided into two rows, containing large grains, and grows wild in Tartary, on the banks of the Saamara; in the vicinity of Babylon; and in Sicily. This species requires a loose rich soil, and must be sown in dry weather, in April: there are two varieties:

a. The *Hordeum distichum nudum*, or the Large Naked Barley, bearing smooth, heavy grains, that afford excellent flour, which, when mixed with that of rye, makes a very palatable nourishing bread, and may therefore be used for puddings and pastry. The beer brewed of it is of a superior richness and flavour; it likewise yields, on distillation, a greater proportion of spirituous liquor than rye: hence it deserves to be preferably cultivated.

b. The *Hordeum frutescens*, or Bushy Barley, one grain of which often produces ten stalks, with broad dark green leaves: it is sown late, and generally about Midsummer; soon ripens; is more prolific, but produces smaller grains than the former variety, and easily degenerates. The Germans sow it very thinly, and in a moist, heavy soil.

2. The *Hordeum vulgare (s. polystichon)*, L. or the Common Barley of four rows. It is productive of longer, though thinner ears and grains, than the first species; and as it thrives well on inferior soils, it is frequently cultivated in preference to the former. In various parts of Germany, and especially in Thuringia, the common barley is very generally sown in autumn, and is not affected by the severest winters.

A variety of this species is the *Hordeum cœleste*, or the WALLACHIAN BARLEY, also called EGYPTIAN CORN. It produces ears and fruit in every respect similar to the former, except that it easily sheds its grains; from which excellent bread is made in Germany, as likewise cakes, groats, &c. Its sowing time is the month of April, when it is deposited in a well-manured middle kind of soil.

3. The *Hordeum hexastichon*, L. or SIX-ROWED BARLEY. This sort is uncommonly fruitful, so that it is said to produce one-third more in quantity than any other species (except the next following); though, in ordinary seasons, the grains of two of the rows do not attain to maturity. It is sown in a well-prepared and tolerably rich soil, either in April or about Michaelmas: in the former case, it may be mowed so early as Midsummer-day. This species, however, is not so proper for malting and brewing beer, as for being reduced either to groats and flour, or converted into ardent spirits.

4. The *Hordeum Zeocriton*, L. or BEARDED BARLEY, or RICE BARLEY, with short and coarse stalks, as likewise short though

broad ears, divided into two rows. When cultivated on a good soil, and thinly sown, it is the *most productive of all the species of barley*, and possesses the additional advantage, that it does not droop its ears nor lodge, even in rainy seasons. Each row contains from twelve to fifteen small grains: these yield an excellent white flour, which, for most culinary purposes, may be substituted for that of wheat. In England, the best home-brewed ale is produced from this grain; for the culture of which, we shall give a few directions in the sequel.

5. The *Hordeum murinum*, L. or WALL BARLEY; a native, though uncultivated English plant, which grows generally on the sides of roads, walls, &c. Its blossoms appear in May and June: horses and cows are particularly fond of it.

6. The *Hordeum pratense*, L. or MEADOW BARLEY, grows on pastures, meadows, near the roads, hedges, &c.; blossoms in June and July, and is an agreeable fodder to all kinds of cattle.

7. The *Hordeum maritimum*, L. or SEA BARLEY; the production of pasture grounds and gravelly shores.

Cultivation.—Barley, in general, requires a dry, light, mellow and rich soil: hence extraordinary care is requisite where it is to be sown in clay. Immediately after the foregoing crop is removed, the land ought to be ploughed; which lays it open to be mellowed by the frost and air. In order to promote this effect, *ribbing*, or a peculiar method of ploughing, has been introduced, to expose the greatest extent of surface. For the improvement of dry clayey land, Prof. BRADLEY recommends a manure of rich dung, ashes, chalk, or lime; and for some particular soils, malt-dust or soot are very useful; but, according to Sir HUGH PLAT, soap-boilers' ashes are the most fertilizing substance for the growth of barley, even upon barren grounds.

The comparative advantages of *drilling* and *broad-casting*, are stated by Mr. PETER SMITH, of Hornchurch, Essex, as follows: in the last week of February, 1793, he drilled three acres of turnip-land with barley, at twelve inches intervals with two bushels of seed per acre; it was scarified and harrowed across the latter end of March, and horse-hoed the second week in April; at the same time he sowed the grass-seeds, which produced fine plants, far superior to the broad-cast. The produce of the drilled barley was eighteen quarters three bushels, from three acres.

On the same day, he sowed three acres of broad-cast in the same field and state of cultivation, with three bushels of seed per acre, and also sowed the grass-seeds at the same time. The produce of these three acres amounted only to fifteen quarters and three bushels.

As it is of great consequence in the production of this grain, that it may ripen equally and uniformly, to prevent that inequality which would render it less valuable, we shall communicate the following method of remedying this defect. It is certain, that barley which comes up speedily in a dusky soil, will gain great advantages over seed-weeds: to forward, therefore, its vegetation, some farmers take out about one-third from every sack of seed-barley or bear, to allow for the swelling of the grain, which they steep thoroughly in clean water, for at least twenty-four or thirty-six hours, according to the more or less dry constitution of the season. For our part, we would prefer steeping the grain; because in this manner all the light and unripe grains swimming on the top, may be easily skimmed off, and thus perhaps the *smut* at the same time prevented. Although *quick-lime* has often been recommended to be mixed with the wet barley, before it is sown, yet we agree with those who are of opinion, that it poisons the seeds, absorbs part of its useful moisture, and injures the hands of the sower. As clean water imparts no tenacity, the seed will scatter properly; but being swelled in the proportion of three to four, or two to three, it is necessary to use a fourth or third part more in bulk; to harrow it in, as quickly as possible, after it is sown; and, if convenient, to give it the benefit of a fresh furrow. By this method, it appears above ground, at the farthest, in a fortnight, if these particulars be duly attended to.

A correspondent of the Bath Society states, that in the remarkably dry spring of 1783, he soaked his seed-barley in the black water taken from a reservoir which constantly received the draining of stables. As the light corn floated on the surface, he skimmed it off, and suffered it to rest twenty-four hours. On taking it from the water, he mixed the seed-grain with a sufficient quantity of wood-ashes, to make it spread more regularly, and sowed with it three fields. The produce was *sixty bushels per acre*, of good clean barley, without any *small* or *green* corn, or weeds at harvest. He also sowed several other fields with the same seed, *dry*, and without any preparation, but the crops were poor, producing only twenty bushels per acre, and much mixed with green corn and weeds.

There is a species of this grain which was introduced into Britain about thirty years since, by Mr. HALLIDAY, and is hence called by his name, or sometimes *Siberian Barley*; it is possessed of qualities that entitle it to particular consideration as an object of importance in agriculture. From a quart of it sown in May 1768, he procured nearly a bushel, which he sowed in April 1769, in drills drawn by a plough; and from this he reaped thirty-six bushels of clean corn. Since that period, Mr. HALLIDAY has made many experiments to ascertain the merits of this prolific grain as bread-corn, and as proper for malting.—He accordingly informs us, in the second volume of the *Georgical Essays*, price 2s. 6d. published in 1771, that its flour makes excellent bread, peculiarly retentive of moisture; and the ale brewed from its malt has a fine colour, flavour, and body. (See the variety of our *second* species, from which it will appear that this grain is the same which Dr. LOCHSTER, in his Latin Dissertation, *On the Medicinal Plants of Norway*, feelingly characterizes, by calling it the *Heavenly Barley*, because it is equally grateful and efficacious.)

As a proof of the extraordinary fecundity of barley, and how much the fertility of the soil contributes to the increase of vegetable productions, we shall mention an instance which occurred in the summer of 1797, at Reichenbach, in Upper Saxony. Two grains of our third species being planted close to each other, in a common garden soil, grew briskly, and spread with no less than one hundred and thirteen stalks, which almost uniformly produced long ears: these contained the surprizing number of two thousand five hundred and thirty-four grains, of which two thousand two hundred and five were perfectly ripe and sound, but the remaining three hundred and twenty-nine were of inferior size and weight. According to this computation, *one bushel* of barley, in a rich and mellow soil, might occupy in planting, at least, *twenty acres!*

We presume that the following additional observations on the culture of this valuable grain, made by a Norfolk farmer, will not be unacceptable to the practical reader. The best soil, in general, is that which is dry and healthy, rather light than stiff, and yet of sufficient tenacity to retain the moisture. On such land, the grain acquires the best colour and body, is the most nimble in the hand, and has the thinnest rind; qualities which eminently recommend it to the maltster. But, if the land be poor, it should be kept dry and warm; in which case it will often bear better corn than richer land in a cold and wet situation.

The best seed is of a pale colour and brightish cast, without any deep redness or black tinge at the tail. A slight shrivelling of the rind proves it to have a thin skin, and that it has sweated in the mow; both being favourable circumstances. As this grain will grow coarser every succeeding year, it should never be sown for two successive seasons on the same soil.

Sprinkling a little soot over the water in which seed-barley is to be steeped, has been of great service, by securing it from the depredations of insects. In very dry seasons, barley that has been wetted for malting, and begins to sprout, will come up sooner, and produce as good a crop as any other. If sown after a fallow, three times ploughing is necessary. On lands well manured, clover may be sown with barley; the former of which, after harvest, affords good fodder during the following winter, as well as from the next spring to July; when the land should be fallowed till the succeeding spring, and again sown with barley and clover: this method does not exhaust, but promotes, the fertility of the ground, while it produces large crops. The lightest lands are fit for receiving the seed in April; those of a moist nature, in May; because all soils liable to be infested by weeds, bear the best crops when sown late, with a view to stifle their growth by the ascendancy of the barley.

Although the broad-cast, at two sowings, is the common method, and the usual allowance from three to four bushels per acre, yet much grain is thus unnecessarily wasted. Half the quantity, and even less, if sown equally, would not only afford a better crop, but the corn also would be less liable to lodge; for weak stalks, standing close together, are less capable of resisting the force of winds, or supporting themselves under heavy showers.

Unless the land be very light and rich, the method of setting and drilling will not answer. Although one root will produce eighty stalks, all having good and long ears filled with superior grain, yet it is to be apprehended, that this process of planting is too expensive in a country where manual labour is performed

formed by free-born subjects.—Hence it would be preferable to sow thin on poor lands, in order to allow sufficient room for the nourishment of each plant; as it is proved by experience, that this simple method is the most beneficial.

It has farther been suggested, when the barley is sown and harrowed in, that, after the first shower of rain, the land should be rolled, to break the clods; which, by closing the earth about the roots, will be of great advantage to it in dry weather. After the barley has been above ground three weeks or a month, it should again be rolled with a heavy roller, to prevent the sun and air from penetrating the ground, to the injury of the roots. This rolling, before the barley branches out, is said to be attended with another advantage, namely, that it will cause the plant to spread into a greater number of stalks, so that if they be thin, the ground will thus be filled, and the stalks strengthened. Whether this expedient be proper for all soils, indiscriminately, we are inclined to doubt, though we do not hesitate to approve of it for very light lands, which are neither loamy nor otherwise too stiff.

Lastly, if the blade grow too luxuriantly, as is the case in warm and wet springs, mowing is said to be preferable to feeding it down by sheep; because the scythe removes only the rank tops, but those animals, being fond of the sweet end of the stalk next the root, will often bite so close as to injure its future vegetation.

With respect to the time when barley is fit to be mowed, farmers frequently fall into the error of cutting it before it is perfectly ripe; thinking it will attain its perfect maturity, if they allow it to lie in the swarth. This, however, is a very common error, as it will shrivel in the field, and afterwards make but an indifferent malt; it also threshes with more difficulty, and is apt to be bruised under the flail. The only certain test of judging when it is fit to mow, must be from the drooping and falling of the ears, so as to double against the straw. In that state, and not before, it may be cut with all expedition, and carried in without danger of heating in the mow. To obviate such accidents, and secure it from being mow-burnt, it is advisable to prepare a large sheaf, or two sheaves, of straw, closely tied together, which should be placed in the centre, when the stack is commenced; and as the layers of corn rise, other sheaves must be put on the first; so that when the whole stack is completed, and the sheaves are removed, a funnel, or vent-hole, may be continued from the bottom to the top. After withdrawing the sheaves, the stack should be covered with a bottle of straw, before it is thatched.

Barley lying in the mow unthreshed, will keep for one or two years, if the above stated method be adopted. But when this grain is converted into malt, it can with difficulty be preserved longer than *one* year, without being infested by *weevils*. One of the best remedies to destroy these vermin, is dry worm-wood laid in the malt.—For farther information on this head, see Malt.

Numerous have been the attempts to cure the *smut* in barley and other kinds of grain; a disease which by some is attributed to the generation of certain minute insects that breed in light and corrupted corn, sown in a moist and unfavourable season; but by others, and with more probability, to the influence of the atmosphere, wafting perhaps insects from such regions as are infested with them. Mr. JOHN REYNOLDS, of Adisham, and several other writers since his time, assert that the smut in corn (especially in wheat) may be effectually prevented, by simply steeping the seed in a brine made of lime, salt, and water; and that he *never* had any black wheat from seed thus steeped.—Experience, however, has frequently evinced the contrary; and as long as it remains undecided, whether the smut is conveyed by the air, or generated by small insects, we cannot offer an adequate remedy for this troublesome and destructive disease in corn.—See the article SMUT.

The best sort of barley is that which is thick in the grain, smooth, weighty, inclining to a whitish colour, and neither too old nor new. Mr. JOHN KERRICH, an eminent maltster at Harleston, asserts, that out of a coomb of *discoloured barley*, more than two bushels will not, in most instances, work on a malting floor; nor can such grain, in his opinion, be relied upon for seed, as it does not vegetate better in the ground than on the floor. He therefore advises farmers to sow bright barley, or at least such as is kiln dried, which he knows from experience will vegetate; or to dry it in the spring by exposure to the sun; an expedient that may probably produce an effect similar to that of kiln-drying. We are much inclined to doubt the latter part of this information, though we allow Mr. KERRICH the credit of having stated an useful fact, as far as it relates to the process of malting; but so long as the *corculum*, or heart of the seed, is not injured, we are of opinion that it will always germinate, independently of any external discoloration.

Uses.—Beside the almost incredible quantities of barley used in brewing ale and beer of different kinds, the consumption of this grain in broths is very considerable, especially in Scotland and Germany; in both countries *barley-broth* is as common a dish as *soup* in France. Hence *pearl-barley* is prepared in peculiar mills, where it is freed of the husk, and reduced to the size of small shot, by grinding away all the exterior parts to the very heart of the grain. The Scots and Germans, however, are more saving in their domestic economy, especially the lower classes of people, who frequently perform that process by hand-mills, or more commonly, in *stamping-mortars*, where the barley is freed from its husks, and rendered fit for culinary purposes. The latter are of a very simple construction, and may be very easily made, by excavating a heavy and firm block of wood sufficiently deep, from eighteen to twenty-four inches, and then adapting to it a wooden pestle, at the lower end of which a few large iron nails with smooth heads are generally fixed, for more effectually striking the barley and separating its husks. Such an implement is also useful for blanching wheat, oats, and many other articles for culinary purposes: we therefore seriously recommend its introduction into every family, which is desirous of reducing the consumption of bread-corn, and lessening the dangers of adulteration, which (whether well or ill-founded), resound from every quarter of the metropolis.

Properties.—Barley has, from the earliest ages, been considered as wholesome and nutritive food for man and cattle. In diseases of the kidneys, and the breast, as well as in that state of the body where it is said to abound in acrimonious humours, decoctions made of this grain, sufficiently strong, and acidulated with vinegar and sugar, are eminently useful.—(See also, WORT.)

As a cooling and diluent beverage, barley-water is of essential service to febrile patients, and in all inflammatory cases, where preternatural heat and thirst prevail; but to promote its salutary effect, the grosser parts, which remain after decoction, ought not to be swallowed.

BARM. See YEAST.

BARN, in husbandry, a covered building or place, with vent-holes in the sides, for laying up any kind of grain, hay, or straw.

This kind of store-house being so well known to all rural economists, no farther description will be necessary: but as several plans have been proposed for its improvement, we shall give an account of those which appear the most worthy of notice.

In the sixteenth volume of Mr. ARTHUR YOUNG'S "*Annals of Agriculture*," we find the following description of a barn, &c. communicated to the editor by the Rev. ROGER KEDINGTON, of Rougham, near Bury St. Edmund's:—"Let the underpinning be of brick or stone, two feet high above ground, and let the sides be boarded: the roof of the barn will be best covered with reed or straw, and those of the stables with slate, or glazed tile; because they must be more flat, and the water which runs from the roof of the barn would injure most other coverings. At each end of the barn, and over the back-door, small doors, four feet square, should be fixed, at the height of twelve feet from the ground; the two former for putting corn in at the ends, and the latter for filling the middle of the barn, after the bays are full. All the bays should have a floor of clay or marl, and the threshing-floor be made with hard bricks, which will be sufficient for all sorts of grain, except wheat and rye; and for threshing them, it will be good economy to have planks of oak or red deal, well fitted together and numbered, to be laid down occasionally, and confined by a frame at their ends. A barn built on such a plan would hold a great deal of corn, and be filled most conveniently: and if stacks of corn were built at each end, they might be taken in without any carting. If more buildings are requisite, two may be added on the backside, like the stables in front: otherwise, if doors are made under the eaves on the backside, as directed at the ends, and stacks be placed opposite to them (just far enough to avoid the eaves dropping), by placing a waggon between them and the barn by way of a stage, those stacks may be taken in without carting; which method prevents a great waste of corn, and much trouble. The spars of the roofs of the stables rest upon the upper sills of the sides of the barn, and the outside wall of the stable is eight feet high: the barn supplying the highest side, and one end of each stable; and the stables in return are buttresses to the barn, and strengthen it greatly."

This building is of the following dimensions: The length of the barn inside is 68 feet; its width 22, 1; the height of the sides 17 feet; of the front doors 15 feet; of the back doors 8 feet and 6 inches; the stable at each side, in length 26 feet 6 inches, in width 14 feet; the door 4 feet; the threshing-floor has in front an entrance of 11 feet; behind, of 9 feet 6 inches; and the width of the porch is 14 feet. The whole expence of erecting this fabric, in the year 1791, was stated to be nearly three hundred pounds.

Mr. Arthur Young has, in the same volume, inserted a plan for a barn, and other buildings necessary for cattle. The dimensions of this structure were given in consequence of a request made by the late General Washington to the author, that he would send him a sketch of a good barn, and the necessary out-buildings, proportioned to a farm of five hundred acres. The threshing-floor is large enough for three men to work on, who, in the course of a winter, can thresh the corn produced on such a farm.

This plan appears to us, by far the most advantageous of any that has fallen under our observation; we have therefore been induced to describe it, for the information of our readers.

The inner width of the barn is 27 feet square, on each side of the threshing-floor. The porch 11 feet 4 inches, by 12 feet 3 inches. Threshing-floor 39 feet by 20, on its upper end, and 12½ feet at the small door of the porch, which is 6½ feet in width. The great door at which the carts enter with corn, 14 feet 9 inches. The sheds for cattle, on the four longitudinal sides of the bays, are 27 feet by 12. Mangers, 2 feet broad, out of which the cattle eat their food. The passages for carrying the straw from the threshing-floor to feed the cattle, are between two and three feet wide. Each passage has a door; there are four principal posts to each shed, besides the smaller ones, and gutters for conveying the urine to four cisterns, from which it is every day thrown upon dunghills, placed at a convenient distance. From the mangers to the gutters there is a pavement of bricks upon a slope, laid in such a manner as to terminate 6 inches perpendicular above the gutters; which pavement is 6 feet broad from that edge to the manger. The gutters are from 18 to 20 inches broad. There are four sheds for various uses, one at each corner of the threshing-floor. At each end of the barn there are two yards with a shed, to be applied to any purpose wanted: one for sheep, surrounded with low racks, and the other divided for a horse, or two, loose, if necessary: the other half is for yearling calves, which thrive better in a farm-yard, than when stalled. These yards are inclosed by walling, or pales. The main body of the barn rises 14, 16, or 20 feet to the eaves. There are various sheds placed against the walling, as this is the cheapest way of sheltering cattle that has yet been discovered.—Should the number of cattle intended to be kept, be greater than here admitted, a circular shed may be erected fronting the small door of the porch, and the hay-stacks be conveniently disposed near those sheds appropriated for cows, horses, or fat cattle. Corn-stacks must be built on the opposite side of the barn.

In the year 1797, a model of a barn, upon a new construction, was presented to the Bath Society by Mr. DOBSON, carpenter, of Norwich, who received a premium for his contrivance. The difference between the common barn, and that just mentioned, is as follows:—The area of the former, 1475 square feet; 24,426 cubic feet for corn only; 702 cubic feet of timber; the latter, according to the model, 1472 square feet, the area; 30,900 cubic feet, for corn only; and 445 cubic feet of timber. By this calculation it appears, that a barn built according to Mr. DOBSON'S plan, gains on one in common use, of the same area, 6474 cubic feet of space, and requires 257 cubic feet less of timber: and as there is nothing in its construction which would increase the price of workmanship, the cost of one on this plan, and another of the common kind, would be as 445 to 702; and the mathematical strength of the former is obvious.

A representation of the model above alluded to, is given in the sixth volume of the *Repertory of Arts and Manufactures*.

BARN-FLOORS.—The best kind are to be found, according to Mr. MARSHALL, in the district of Cotswold, Gloucestershire: they are from 12 to 14, by 18 to 20 feet; some of *oak*, others of *stone*; but a species of earthen floor, which is made here of the calcareous earth of the sub-soil, a kind of ordinary gravel, and the chippings of freestone, is considered to be superior to floors of stone, or any other material, except sound oak-plank. The great excellence of these floors is owing partly to the materials of which they are made, and partly to the method of forming them, which is, perhaps, peculiar to that district; it is described as follows:

"Earthen barn-floors are made, in other places, of *wet* materials; a kind of mortar, which, as it dries, is liable to crack, and requires some months after it is made, to dry it hard enough for use: on the contrary, the materials in the practice under consideration, are worked *dry*; they of course do not crack, and are ready for use as soon as finished. The materials, mixed together, are sifted twice over: the first time, through a wide sieve to catch the stones and large gravel, which are thrown to the bottom of the floor; the next, through a finer sieve, to separate the more earthy parts from the finer gravel, which is spread upon the stones, and upon this, the more earthy parts, making the whole about a foot thick, and trimming down the different layers closely and firmly upon each other. The surface being levelled, it is beaten with a flat wooden beetle, made like the gardeners' turf-beater, until the surface become as hard as a stone, and rings at every stroke, like metal. If properly made, they are said to last a great number of years, being equally proof against the flail and the broom.

"These materials, it is true, cannot be had in many districts; but the principle of making barn-floors with *dry materials* being known, other substances than these which are here in use, may be found to answer the same purpose."

The barn-floors generally used in most parts of the kingdom, consume a quantity of large and valuable oak-timber, often such as might be converted into two and a-half inch ship-timber; they last only from fifteen to twenty years, and require frequent repairs. Hollow beech-floors, which were introduced a few years since, on account of the very high price of oak-timber, are found not to wear more than seven or eight years. We think it necessary, therefore, to give a description of a moveable barn-floor invented by Mr. JOHN UPTON, of Petworth, Sussex, for which he received a reward of thirty guineas, from the Society for the Encouragement of Arts, &c. in the year 1796.

" This floor effectually prevents a waste of corn, in threshing; it gives an addition of at least one foot in height at the doors, by which means a higher load of corn can be admitted; and also, as the horses do not draw the waggon up an ascent, and upon a slippery floor; but upon a hard bottom, and level with the farm-yard, two horses can perform the work, where four are now generally used. It affords a warm and convenient shelter for hogs, when it is down; and, when turned up, it may be used as a stable, ox-stall, hovel, or cart-house; two men can place or displace it in five minutes: and, from its allowing, at all times, an easy access to dogs and cats under it, it affords no harbour for vermin.

" The following are statements of the materials used, and the expence of the barn-floors, respectively.

" *Barn-floors now in common use* :—The original floor laid on the ground, with three cills, and two-inch oak-plank, which in general lasts from fifteen to twenty years, cost 19l. 10s.—The hollow-floors on brick quoins, with two and a half inch oak-plank, cost 31l. 10s.

" *John Upton's Barn-floor* :—The new-constructed hollow-floor is composed of oak-plank, five feet eight inches in length, and one inch and a half thick; whereas three-fourths of the plank used in the original floors, are fourteen feet in length:—the whole expence 23l. 10s.

" The plank for the last-mentioned floor may consist of deal, beech, or elm; as they will be perfectly free from decay by damps, which will considerably lessen the expence of the new-constructed floor: these are the estimates when the materials are supplied by a carpenter. When they are furnished from the estate, a very considerable advantage arises to the landlord, as the new-constructed floor is composed of small scantlings, which may be obtained from short timber, much inferior in value to those used for the other floors.

" Where there are more than one barn in a farm-yard, this floor may be farther useful, as it may be removed from one barn to another, and save the expence of at least one out of three.

" It is supposed, that a floor constructed in this manner will last for one hundred years, or indeed as long as the barn; because it is perfectly free from damps, on account of the distance at which it lies above the ground, with a free current of air passing under it when down; and when it is turned up (which it probably will be at least half the year), it will be as free from decay as the posts or beams of the barn."

BAROMETER, an instrument of modern invention, for measuring and ascertaining the weight of the atmosphere, as well as the height of mountains, and likewise foretelling, with tolerable accuracy, the probable changes of the weather. That such an instrument must be of extensive utility to every person engaged in the active pursuits of life, whether those of gardening and agriculture, or in the various departments of the domestic and useful arts, will be universally admitted. Hence we propose to bestow a considerable share of attention on this interesting subject.

History and *analysis*:—When Galileo, in the beginning of the seventeenth century, discovered that water could not ascend in a pump, unless the sucker reached within 33 feet of its surface in the well, he justly concluded that the ascent of water in pumps, was effected by the pressure of the atmosphere, and not by the power of suction; that a column of water 33 feet high was a counterpoise to one of air of an equal diameter and base, the height of which extended to the top of the atmosphere; and that consequently the water could not be attracted any farther by the sucker. This important discovery induced his great pupil Torricelli, to substitute a column of mercury for that of water; because the former fluid being about 14 times heavier than the latter, he wanted, according to that proportion, only about 29½ inches of quicksilver to determine the accuracy of his experiment. He accordingly found that, after having filled a glass tube with mercury, and inverted it in a bason of the same semi-metal, it descended in the tube till it became stationary at about 29½ inches above the surface of that contained in the lower vessel.

Many years, however, elapsed after this experiment, before any notice was taken of the circumstance, that this pressure of the air considerably varied at different times, though the tube was uniformly kept in the same situation. Indeed, these variations in the mercurial column, were too obvious to remain long unnoticed; and philosophers began minutely to mark their degrees. As soon, therefore, as this point was properly attended to, they observed that the changes in the rise and fall of the mercury were in general very speedily succeeded by variations in the weather. Hence the instrument obtained the name of *weather-glass*, for which purpose it has, since that period, been generally employed.

It is surprizing that the ancients were unacquainted with the laws by which the ambient air presses on our bodies as well as on all inanimate matter; and that Otto Guericke, a German, to whom the world is indebted for the discovery of the air-pump, was the *first* who excited the attention of philosophers to this important subject. Although Torricelli had previously ascertained, by his experiment made in the year 1646, that the mercury in a tube of four feet in length did not remain stationary at 29½ inches, but varied according to the greater or less degree of density of the atmosphere; yet it does not appear that he applied this great discovery to the purpose of predicting the *future*, or impending changes of the weather

ther. Even prior to that date, namely, in 1643, experiments were instituted, both at Florence and Rome, with the Torricellian tube; and in 1648 PERIER, a Frenchman, made use of two similar instruments; one of which he left in a valley, while with the other he ascended one of the highest mountains of Auvergne; and thus he observed, that the atmosphere on the top of the hill did not press upon the mercury with a force equal to that observed in a lower situation, where he found the quicksilver much lower than in the former region; and hence he judiciously concluded, that the air must be lighter, or more rarefied, in proportion to the altitude of places. But that these remarkable changes were in any degree connected with the present, or future, constitution of the weather, was doubtless discovered by GUERICKE, though Mr. BOYLE, whose talents and genius deserve the highest admiration, improved and applied it to philosophical purposes. This assertion is amply supported by a passage in a printed work still extant, and entitled "*Casp. Schotti Technica curiosa*" (ii. 22. p. 52); by which it appears, from a letter addressed to the author by GUERICKE, that the latter had constructed a tube filled with mercury, on the top of which fluid he placed a small wooden figure, that rose and fell with the quicksilver, pointing out with its finger, or index, the variations in the gravity of the air, and at the same time the concomitant changes of the weather.

The compound barometer, the tube of which is filled not only with mercury, but likewise with another coloured fluid, was invented by CARTESIUS and HUYGENS, much about the same time; but the latter considerably improved it, by using a double tube, and mixing the water with one-sixth part of aqua-fortis, to prevent its congelation in winter.

The *conical* or pendent barometer was contrived by M. AMONTONS; the well-known *diagonal* barometer, by Sir SAMUEL MORELAND; the *wheel* barometer, by Dr. ROBERT HOOKE, who likewise improved HUYGENS's double barometer above-mentioned;—the rectangular horizontal barometer was invented by BERNOUILLI, or rather CASSINI; and the credit of another invention, by which four tubes (containing mercury, and a lighter fluid alternately) are connected together, is likewise due to AMONTONS.

The *marine* barometer was also invented in the beginning of the 18th century, by Dr. R. HOOKE, and afterwards rendered more perfect by M. PASSEMENT, who, by the simple, but effectual expedient, of twisting the middle part of the common, or Torricellian tube, into a spiral of two revolutions, prevented the oscillations of the mercury on ship-board. By this ingenious contrivance, the shocks which the mercury sustains from the motions of a ship, are effectually broken; as, from the turns of the instrument, the impulses are transmitted in contrary directions.

But of all the instruments contrived for the purpose of ascertaining the specific gravity of the atmosphere, that of MAGELLAN, in the year 1765, deserves a distinguished place; as it points out not only the changes occurring in the atmosphere, but likewise, and in a very sensible manner, the different degrees of temperature of the air.

Among the *travelling* barometers, that of M. DE LUC, improved by J. F. LŬZ, is the most useful and compendious.—A *wind-barometer* has also been contrived by Mr. WILKES, of which we propose to give an account under the article, WIND.

A great variety of other useful instruments have been invented since the days of TORRICELLI, upon similar principles, and with mechanical additions more or less complicated; but it must be acknowledged, that the simple barometer of his invention is the most exact, though not the most sensible balance for weighing the atmosphere, and has therefore been most generally adopted.

Rationale.—M. de LUC, not satisfied with the different hypotheses brought forward by WALLIS, HALLEY, LEIBNITZ, MAIRAN, &c. to explain the variations of the barometer, has satisfactorily refuted the conjectures of all his predecessors, and endeavoured to establish his own, which is founded on a supposition, that a column of air, loaded with vapours, is lighter than a column of pure air of equal bulk. He consequently asserts, 1. That the density of air is the immediate and *only* cause that supports the mercury; and 2. That the more elastic the air is, the less does it press and weigh upon its base: but though there is considerable ingenuity in this explanation, it is by no means conclusive.

Soon after the publication of this theory, M. BEGUELIN, in 1773, endeavoured to prove, that the variation of the whole mass of the atmosphere, as well as that of the spring or elasticity in a part of this mass, are the *two* general causes of the variations of the barometer; and that the primitive causes of this remarkable effect are, *heat*, *cold*, *dryness*, and *moisture*, with their different combinations.

We cannot enter into the particulars relative to the operation of these various causes, but shall briefly observe, that *heat* dilates the air; *cold* contracts it, and draws together those parts which it is the property of heat to separate: hence, the natural effect of the former is expansion; the consequences of the latter, condensation, compression of its spring, and an increase of pressure, on account of which, the mercury rises in the barometer.

Respecting the effects of *dryness* and *moisture*, it deserves to be remarked, that, if the latter diminishes the pressure of the air, by relaxing its spring, it on the other hand loads it with watery particles, which very considerably augment its mass, so that it may be difficult to determine how far the moisture of the air exerts its influence on the rise and fall of the barometer. The same observation may be applied to dryness, which dispels the watery particles that increased the weight of the air; so that there appears to be a perpetual conflict between the effect of *spring* and *mass*, between *elasticity* and *weight*; and experience alone can inform us whether, in this contest of the elements, the effect of elasticity is much superior to that of weight. Such is the plausible explanation of BEGUELIN, and we have only to regret, that the result of his inquiries, still leaves the subject involved in much doubt and difficulty; because even this theory does not account for the *sudden* changes of the atmosphere.

Nevertheless, experience has furnished us with a sufficient number of facts, from which we may, with tolerable precision, ascertain the present, and predict the future state of the surrounding element, by the *practical* use of the barometer. Thus, 1. The rising of the quicksilver *generally* presages fair weather, as its falling does the contrary, or rain, snow, high winds and storms; 2. In very *hot* weather, the sudden falling of the mercury portends thunder; 3. In *winter*, the rising indicates frost; and in frosty weather, if the mercury falls three or four divisions, there will certainly follow a thaw; but if it rise in a continued frost, it will always be accompanied with snow; 4. When foul weather quickly succeeds after the falling of the mercury, it will not be of long duration; nor are we to expect a continuance of fair weather, when it soon succeeds the rise of the quicksilver; 5. If, in foul weather, the mercury happens to ascend considerably, and continues in an advancing state for two or three days successively, then we may expect also a continuance of fair weather; 6. If, in clear weather, the mercury falls remarkably for two or three days together, before the rain sets in, it is then highly probable that it will be succeeded by much rain, and perhaps high winds; 7. The unsettled motion of the mercury indicates changeable weather; 8. Respecting the words engraved on the register-plate, they cannot be strictly relied upon to correspond exactly with the state of the weather; though it will in general agree with them as to the mercury *rising* and *falling*. These words deserve to be particularly noticed when the mercury removes from "Changeable" upwards; as those on the lower part should be adverted to, when the quicksilver falls from "Changeable" downwards. In other cases, they are of no use; for as its rising in any part forebodes a tendency to fair, and its falling to foul weather, it follows, that though it descend in the tube from *Settled* to *Fair*, it may nevertheless be attended with a little rain; and when it rises from the words "Much Rain" to "Rain," it shews only an inclination to become fair, though the wet weather may still continue in a less considerable degree than it was when the mercury began to rise. But if the mercury, after having fallen to "Much Rain," should ascend to "Changeable," it predicts fair weather, though of a shorter continuance than if the quicksilver had risen still higher; and so, on the contrary, if the mercury stood at "Fair," and descends to "Changeable," it presages foul weather, though not of such duration, as if it had fallen lower.

These observations are founded on experience, and we are indebted for them chiefly to Mr. PATRICK, who has investigated this subject with considerable precision. It appears from the result of these facts, that the height of the mercury is not the principal criterion for ascertaining the probable changes of the weather, but rather the relative motion of that fluid in the tube. Hence, to enable us to judge rightly of the impending variations, we ought to possess a correct knowledge, whether the mercury is actually rising or falling. For this purpose, the following rules, stated by Mr. ROWING, may be of advantage: 1. If the surface of the mercury be convex, standing higher in the middle of the tube than at the sides, it generally indicates the rising of this fluid metal; 2. If its surface be concave, is is then sinking; 3. If it appear level, it is stationary; 4. If, after shaking the tube of a *small* glass, the mercury rises about half a tenth of an inch higher than it stood before, it is a proof that the air has become heavier; but if it sinks as much, it follows that the atmosphere is lighter. Hence, in making observations on the weather, such a glass should always be previously shaken; because the metal which adheres to the sides of the tube, prevents its free motion, till disengaged by a slight agitation of the instrument. These phenomena are peculiar to places situated at a distance from the equator, and therefore deserve to be attended to in *our* climate: on the contrary, at St. Helena, they would be of little or no service; for, according to the accurate observations of Dr. HALLEY, made in that island, the mercury remained stationary in all weathers. This judicious naturalist has furnished us with the following curious account of these phenomena, and their causes; of which we shall give a concise abstract: 1. In calm weather, when there is a prospect of rain, the mercury is commonly low; 2. In serene and settled weather it is generally high; 3. On the approach of tempestuous winds, though unaccompanied with rain, the mercury sinks lower than on any other occasion; 4. The greatest height of the mercury is observable during the prevalence of easterly or north-easterly winds; 5. In calm, frosty weather, the quicksilver generally stands high; 6. After very great tempests, when the mercury has been very low, it generally again quickly ascends; 7. The barometer in the northern regions exhibits greater variations than in those lying more towards th: South; 8. Within and near the tropics, there is little or no alteration in the mercury, as before observed. Hence Dr. HALLEY is of opinion, that the principal cause of the rise and the fall of the quicksilver must be attributed partly to the variable winds in the temperate zone, the great inconstancy of which, in Britain, is well-known; and partly to the uncertain exhalation and precipitation of the vapours floating in the atmosphere, which is at one time more saturated than at another, and consequently heavier; though the precipitation of aqueous vapours chiefly depends on the previous degree of evaporation.

Our plan does not permit us to accompany these propositions with the explanations given by Dr. HALLEY; and, as the theoretical part has been strongly contested by other philosophers, though not refuted, till the late Dr. BLACK, of Edinburgh, endeavoured to prove the fallacy of all preceding theories; we shall conclude this subject with a summary outline of his doctrine.

According to Dr. BLACK, 1. Vapour is formed by an intimate union between fire and water, by which the *fire*, or *heat*, is so totally enveloped, and its action so entirely suspended by watery particles, that it loses its properties of giving light and heat, and consequently is in a *latent state*; 2. If the atmosphere is affected by any unusual degree of heat, it becomes incapable of supporting a column of mercury so long as before; for which reason that in the barometer sinks.—From these preliminary axioms it follows, that as vapour is formed by the union of fire and water, or the solution of the latter in the former, it is impossible that the vapour can be condensed, until this union or solution be effected. The beginning of the condensation of the vapour, then, or the first symptoms of approaching rain, must be the separation of the fire which lies hidden or involved in the vapour. This may at first be slow and partial, or it may be sudden and violent: in the former case, the rain may come on slowly, and after considerable intervals; in the latter, it will be quick, and in a large quantity. With regard to the effect of this separation between the fire and water, we shall only observe, that as it is gradual and slow, the barometer may indicate rain for a considerable time before it appears: or, if the sensible heat communicated from the vapour to the atmosphere, should be absorbed by the colder parts, or be carried off by any unknown means, or prevented from affecting the specific gravity of the air, the barometer will undergo no change; and yet the vapour, being deprived of the heat necessary to sustain it, must descend in rain; and thus it happens, that the indications of the barometer do not always hold true, respecting the changes of the weather. Hence also it appears, that, though the specific gravity of the air is diminished, unless that diminution proceed from a discharge of the *latent* heat contained in the vapours, no rain will follow; and thus the sinking of the barometer may prognosticate wind as well as rain, or sometimes no change whatever.

Such is the ingenious theory of Dr. Black, who certainly has produced the most philosophic explanation yet offered on this apparently intricate subject; and though his reasoning may not enable us to solve all the difficulties occurring in meteorological investigations, we do not hesitate to say, that it has placed the nature and causes of these phenomena in the clearest point of view, as far as it is possible to account for them, in the present state of physical science. We shall, therefore, conclude with observing, that though the *wind* is certainly not the sole cause of raising and depressing the mercury, yet, in our climate, it has a remarkable influence on the state of the barometer. For, if the mercury falls, when the wind blows from those quarters which generally are productive of much rain, such as the *south* and *south-west* winds are in the environs of London, there is no doubt but wet weather will speedily follow: on the contrary, if the quicksilver rises, while the wind blows from dry quarters, such as the *northerly* and *easterly* regions are to Britain, then it is highly probable that the weather will become fair. But if the mercury rises during a southerly wind, or falls while it blows from the north; in both cases the prognostics are extremely doubtful; as it frequently happens, that the weather does not correspond to the temporary rising or falling of the quicksilver.

A very curious new phenomenon deserves to be mentioned, concerning the state of this instrument, on particular occasions. M. Schmidt, Professor of Mathematics at Pforte, in Germany, lately observed, that his barometer became luminous in the day time, while the horizon was covered with thunder-clouds; and that on the approach of a tempest, there appeared on the surface of the mercury, a small and distinct luminous globe, which could be perceived in day-light, at the distance of several yards. We relate this singular fact; and, not being in possession of farther particulars, we can only conjecture, that such a phenomenon may perhaps be ascribed to the greater rarefaction and electricity of the air in the serene climate of Germany, previous to the explosion of thunder; and likewise to a more phosphorescent nature of the mercury; a property which it doubtless acquires when submitted to the repeated processes of distillation, and other means of purifying that peculiar metallic fluid.—See also SPIDER.

BARREL, in commerce, is a vessel of an oblong size, made of wood, the form of which is generally known, as well as its use for holding various sorts of merchandize: it is also used as a measure for liquids.

The English barrel, wine measure, contains the eighth part of a tun, the fourth part of a pipe, and one half of a hogshead, or 31½ gallons. A barrel of beer should contain 36, and one of ale 32 gallons. The barrel of beer, vinegar, or liquor preparing for vinegar, ought to contain 34 gallons, according to the standard of the ale quart.

Barrel is also used to denote a certain weight of merchandizes, and which differs according to various commodities. A barrel of Essex butter weighs 106 pounds, and of Suffolk butter 256 pounds. The barrel of herrings ought to contain 32 gallons, wine measure; which amount to about 28 gallons, old standard, and consists of about 1000 herrings. The barrel of salmon ought to contain 42 gallons, and a barrel of eels the same quantity: the barrel of soap must weigh 256 pounds.

BARRENNESS, a term synonimous to sterility, in opposition to *fecundity*. That the creation might not degenerate, Nature has wisely ordained barrenness to all monstrous productions; and hence the sterility of mules, &c.

Women frequently become barren after a miscarriage, or difficult labour. Sterility in either sex may also arise from a schirrosity or induration in the organs, by which their functions become impaired, and sometimes even destroyed. The causes of sterility, however, are much more frequent in the female than in the male sex: and these causes, in general, are, schirrosities and obstructions, arising from fear, grief, inordinate passions, intemperance, neglect of cleanliness; but more frequently, in consequence of inveterate complaints of a periodical nature, peculiar to the sex.

Dr. HASELQUIST, in his Travels to the Levant, advises married persons to drink, every night, a teacupful of clove-water for the cure of this complaint.—We have inserted this whimsical recipe, not because any reliance can be placed on so trifling a remedy, but in order to attest the inefficacy of medicines on such occasions, and to assure those who forsake the path of Nature, and expect relief from Art, that they will certainly be disappointed, unless they adopt a more temperate and regular mode of life.

BARTER, or *Truck*, is the exchanging of one commodity for another; and forms a rule in the commercial part of arithmetic, by which the commodities are properly calculated and equalled, by computing the respective value of the different articles offered for exchange.

The proper way of ascertaining the difference of prices in barter would be, to find the price of one of the commodities, and an equivalent quantity of the other, either by practice, or by the rule of three.

BASALTES, in natural history, a hard stone of a black, grey, or sometimes greenish colour; and on account of its constituent parts, and resemblance to *lava*, generally classed among the volcanic productions. Its specific gravity is to that of water, as three to one. The component parts of basaltes are in the following proportion: siliceous earth 50, argillaceous 15, calcareous 8, magnesia 2, and iron 25. It is remarkable, that this fossil is disposed either in solid or jointed columns; the former consisting of five or six pillars, either of an uniform size, or conical, and generally standing close to each other perpendicularly, of different, and sometimes equal length, as if they had been arranged by a skilful artist. The Hebridic island of Staffa is entirely composed of lofty and capacious basaltic columns, the most curious arrangement of which, perhaps on the whole globe, is the celebrated Fingal's cave. In Germany, also, there are several basaltic mountains; for instance, those on the Rhine, and near Freyberg, in Saxony, where basaltes is frequently found of an oval or spherical figure. Spain, Russia, Poland, and Silesia, also produce various basaltic rocks. Great quantities of this fossil are deposited in the neighbourhood of Mount Etna, in Sicily; of Hecla, in Iceland, &c. But the largest mass yet discovered are, what is called the Giant's Causeway, in Ireland.

As naturalists differ in their opinion concerning the origin of this curious substance, whether it be the production of volcanos arising from subterraneous fires, or derive its origin from crystallization by water, we shall state only the result of M. Bergmann's inquiry into this subject, as his explanation appears to be conclusive. He asserts, that both fire and water contribute to form basaltes, and it cannot be doubted that there has been some connection between the basaltic pillars and subterraneous fire, as they are found mixed with lava, and other substances, produced by that element.

Uses.—Basaltes is an excellent material for building houses, and paving streets: it is also employed by lapidaries and statuaries for various productions of art; as well as by artists working in gold and silver, for touch or test-stones. Gold-beaters and book-binders, on the continent, make their anvils of this firm and massy stone; which is also used as an ingredient in the manufacture of glass, especially for producing the common window-glass, and green bottles.

BASILICON OINTMENT, in pharmacy, a preparation consisting of eight parts of hog's lard; five of white resin; and two of yellow wax: or, according to the London College, of nearly equal parts of yellow resin, bees wax, and olive oil.—The former ingredients, prescribed by the Edinburgh College, are cheaper and equally efficacious.

This ointment is generally employed in the dressing of wounds and ulcers, for digesting and cleansing them, as well as for promoting their cicatrization. Modern surgeons, however, are not willing to attribute any considerable effect to *external* applications; for they are well convinced, that the healing of wounds depends more on the spontaneous efforts of Nature, especially in a sound and healthy constitution, than upon any artificial aid by liniments, unguents or plasters; and that little benefit can be derived from them, unless the diseased part be properly dressed and cleansed; while the *internal* state of the body should also be duly attended to. Yet, there are instances on record, in which the basilicon, combined either with a small proportion of the red precipitate of mercury, or, which is still better, the juice of the burdock-root, has proved efficacious in healing scrophulous ulcers, especially those situated near the articulations of bones.

BASKET, a well known utensil, made of twigs interwoven together. Considered as a measure in commerce, it denotes an uncertain quantity, as a basket of medlars is two bushels; of asafœtida from 20 to 50 pounds weight, &c. The Ancient Britons were celebrated for their ingenuity in manufacturing baskets of very elegant workmanship, which they exported in large quantities.

Basket-salt is made from the water of the salt springs in Cheshire, and other places. It differs from the common brine-salt, in the fineness of the grain, as well as on account of its whiteness and purity. In preparing the former kind, some persons use *resin* and other ingredients, for separating the crystals, and reducing them to a smaller grain; others effect this by keeping up a brisk fire under the pans, and constantly stirring the salt; but the most approved method of manufacturing basket-salt is, to take out for this purpose, the third draught of every pan which is working for the common brine-salt; and to do this before the granules or crystals are perfectly formed. Thus the salt will become very fine; and it is then hard pressed into small wicker-baskets, dried at the stove and kept for sale.

As there prevails, in many families, a prejudice against this species of salt, from an idea that some pernicious articles are used in the chemical process of preparing it, we advise those who are under the influence of such apprehension, to reduce common salt to powder, in a marble or iron mortar: but it requires to be previously cleaned or purified, by dissolving, and again evaporating it to dryness; in which state it may easily be pounded.

BAT, or *Vespertilio*, an animal which seems to fill up the chasm between quadrupeds and birds; with the latter, however, it has in common only the power of flying, as Nature has provided it with a smooth gauze-like web, serving the purpose of wings.

There are twenty-eight species of this animal, of which only four are natives of Britain. The common bat is nearly the size of a mouse, and flies about, in quest of moths and other insects, in fine summer evenings, with a rapid and irregular motion, resembling that of a butterfly. When it alights on the ground, it is unable to fly again, till it has crawled to some height. It remains torpid during the winter in some subterraneous retreat, revives in the beginning of spring, and the female brings forth from two to five young at a time, which it suckles like other mammillary animals.

As the bats of our climate are frequently troublesome, by infesting chimneys, and annoying the neighbourhood of dwellings, we shall communicate a method of destroying them, nearly in the words of the *Encyclopædia Britannica.* Take the flower-cups of burdock, whiten them with chalk, and throw them up into the way of their flight: thus attracted by the whiteness of the substance, the bats injure their membraneous wings by the hooks of the bur, and fall to the ground.

In our opinion, these animals are more useful than injurious; as they devour a multitude of insects; though they likewise prey upon bacon, and other animal food suspended in chimneys. But having very formidable natural enemies in the owls, which chase them into hollow trees and obscure holes of walls, there will be little occasion for persecuting them with the burdock.

BATH, in the general acceptation of the term, signifies a convenient receptacle of water adapted to the various purposes of washing or cleansing, and bracing the body, either by plunging, or continuing in it for a certain time.

Baths may be divided into *cold*, *cool*, *warm*, and *hot*: and these again into natural and artificial.

In order to treat this interesting subject systematically, we shall consider it according to the division above-mentioned.

Cold Baths are those of a temperature varying from the 33d to the 56th degree of Fahrenheit's thermometer. The general properties of the cold bath consist in its power of contracting the animal fibres, while it dissipates the *caloric* (or matter of heat) that exists between their interstices, and thus effects a greater approximation of the particles, which were before dilated and relaxed by heat. That such is the natural influence of cold, cannot be doubted; and hence this species of bath, by its powerful action on the whole system, is one of the most important medicinal remedies presented by the hand, and, as it were, supplied by the very bosom of Nature.

Even in the most remote times, cold bathing was resorted to with obvious advantage, by nervous and debilitated persons; but in the dark or middle ages, this genuine source of health was totally neglected, till the good sense of Europeans again adopted it as a general restorative, when the prevailing diseases of relaxation and atony rendered the use of such a remedy inestimable.

The superior advantages of cold bathing over all internal *corroborants*, consists chiefly in its immediate salutary action on the solids, without the intervention of the organs of digestion and nutrition; without having to perform a passage through numerous channels, before it can exert its efficacy. For this obvious reason, it is peculiarly adapted to those constitutions which, though robust, and apparently healthy, are liable to nervous, hysteric, hypochondriacal, and paralytic affections, as well as to frequent attacks of flatulency, and consequent indigestion.

Without expatiating, either on the history, or the sensible effects of the *Cold Bath*, we shall proceed:

I. To a general enumeration of those cases, in which it cannot be resorted to with advantage and safety;

II. To lay down the necessary rules and directions for the use of this *heroic* remedy.

With respect to the former, we must be concise, and shall chiefly point out, by *negative* propositions, those particular states of the body, in which *cold* bathing must *not* be attempted: namely, 1. In a full habit of body, or what is called general *plethora*, on account of the frequent febrile disposition attending such individuals; 2. In hemorrhages or fluxes of blood, open wounds or ulcers, and every kind of inflammation, whether external or internal; 3. In obstructions of the intestines, or habitual costiveness; 4. In affections of the breast and lungs, such as difficult respiration, short and dry coughs, &c. 5. When the whole mass of the fluids appears to be vitiated, or tainted with a peculiar acrimony, which cannot be easily defined, but is obvious from a sallow colour of the face, slow healing of the flesh when cut or bruised, and from a scorbutic tendency of the whole body; 6. In gouty and rheumatic paroxysms; though Sir JOHN FLOYER asserts, that "*Podagries* sometimes have kept their fits off with it;" 7. In cutaneous eruptions, which tend to promote a critical discharge of humours by the pores (yet the celebrated physician just mentioned, informs us, that great cures have been effected in the *leprosy*, by bathing in what he calls "Cold Sulphur Water.") 8. During pregnancy; and 9. In a distorted or deformed state of the body, except in particular cases to be ascertained by professional men.—Sir JOHN farther recommends, but too indiscriminately, the dipping of ricketty children one year old, every morning in cold water; and he is of opinion that, in adults, it prevents the infection of fevers, by making the body less sensible of the changes of air; that, in old women, it stops violent hemorrhages from the uterus; that it has contributed to cure canine madness, poisonous bites of animals, and obstinate agues, by going in previously to the return of the fit, and after all the evacuations of the body have been properly attended to; and, lastly, that the *Sea-water Bath* has been of eminent service in dropsies, and defective hearing; in which last case, he knew a deaf person who could hear perfectly well, on the day he bathed in the sea.

Experience, however, has but too often evinced, that this excellent remedy, whether by fresh or salt-water, cannot be implicitly relied upon in those complaints; nor will it be productive of any good effects, unless our conduct, in general, be accommodated to the following rules:

1. It is a vulgar error, that it is safer to enter the water when the body is *cool*, and that persons heated by exercise, and beginning to perspire, should wait till they are perfectly cooled. Thus, by plunging into it, in this state, an alarming and dangerous chilness frequently seizes them, and the injury sustained is generally ascribed to their going into it too warm; while it doubtless arises from the contrary practice.—Dr. J. CURRIE, of Liverpool, in his valuable "*Treatise on the effects of Water in Fevers,*

(edit. 2d, 8vo. 1799, price 7s.), says, with equal truth and precision, that "in the earlier stages of exercise, before profuse perspiration has dissipated the heat, and fatigue debilitated the living power, nothing is more safe, according to my experience, than the cold bath. This is so true, that I have, for some years, constantly directed infirm persons to use such a degree of exercise, before immersion, as may produce some increased action of the vascular system, with some increase of heat, and thus secure a force of re-action under the shock, which otherwise might not always take place. But, though it be perfectly safe to go into the cold bath in the earlier stages of exercise, nothing is more dangerous than this practice, after exercise has produced profuse perspiration, and terminated in languor and fatigue; because in such circumstances the heat is not only sinking rapidly, but the system parts more easily with the portion that remains."—In short, it is a rule liable to no exception, that moderate exercise ought always to precede cold bathing, to promote the re-action of all the vessels and muscles, on entering the water; for neither previous rest, nor exercise to a violent degree, are proper on this occasion.

2. The duration of every cold bathing applied to the whole body, ought to be short, and must be determined by the bodily constitution, and the sensations of the individual; for healthy persons may continue much longer in it than valetudinarians; and both will be influenced by the temperature of the air, so that in summer they can enjoy it for an hour, when, in spring or autumn, one or two minutes may be sufficient.—Under similar circumstances, cold water acts on aged and lean persons with more violence than on the young and corpulent: hence the former, even in the hottest days of summer, can seldom with safety remain in the bath longer than a quarter of an hour; while the latter are generally able to sustain its impressions for double that time.

3. The head should first come in contact with the water, either by immersion, pouring water upon it, or covering it for a minute with a wet cloth, and then diving head foremost into the water.

4. As the immersion will be less felt when it is effected suddenly; and as it is of consequence that the first impression should be uniform over the body, we must not enter the bath slowly or timorously, but with a degree of boldness. A contrary method would be dangerous; as it might propel the blood from the lower to the upper parts of the body, and thus occasion a fit of apoplexy. For these reasons, the *shower bath* is attended with considerable advantages, because it transmits the water quickly over the whole body; and, consequently, is more consistent with the rules beforementioned.

5. The morning is the most proper time for using the cold bath, unless it be in a river; in which case the afternoon, or from one to two hours before sun-set, will be more eligible; as the water has then acquired additional warmth from the rays of the sun, and the immersion will not interfere with digestion: on the whole, *one* hour after a light breakfast,—or *two* hours before, or *four* hours after dinner, are the best periods of the day, for this purpose.

6. While the bather is in the water, he should not remain inactive, but apply brisk general friction, and move his arms and legs, to promote the circulation of the fluids from the heart to the extremities. It would, therefore, be extremely imprudent to continue in the water till a second chillness attacks the body; a circumstance which would not only defeat the whole purpose intended, but might at the same time be productive of the most injurious effects.

Immediately after the person leaves the bath, it will be necessary for him, with the assistance of another person for dispatch, to wipe and dry his body with a coarse and clean cloth. He should not afterwards sit inactive, or enter a carriage, unless warmly clothed and wearing flannel next the skin: if season and circumstances permit, it will be more proper, and highly beneficial, to take gentle exercise till the equilibrium of the circulation be restored, and the vessels, as well as the muscles, have acquired a due degree of re-action.

The best place for cold bathing is in the invigorating water of the sea, or a clear river; and where neither of these can be conveniently resorted to, we recommend the SHOWER BATH; an apparatus of which may be procured from the tin-man. Its effects are doubtless more powerful than those of the common bath: and though the latter covers the surface of the body more uniformly, yet this circumstance by no means detracts from the excellence of the former; because those intermediate parts, which the water has not touched, receive an electric and sympathetic impression, in a degree similar to those brought into actual contact. As every drop of water from the shower bath operates as a partial cold bath, its vivifying shock to robust individuals is more extensive, and beneficial, than from any other method of bathing.

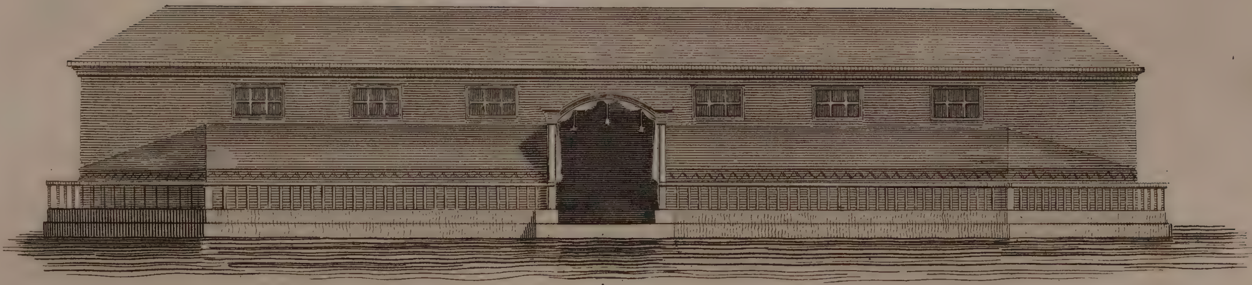
Hence this bath is possessed of the following important advantages; 1. The sudden contact of the water may be repeated, prolonged, and modified at pleasure; 2. The head and breast are tolerably secure, as it descends towards the lower extremities: thus, the circulation is not impeded, breathing is less affected, and a determination of blood to the head and breast is effectually obviated; 3. As the water descends in single drops, it is more stimulating and pleasant, than the usual immersion; and can be more readily procured and adapted to circumstances; lastly, 4. The degree of pressure from the weight of water, is here likewise in a great measure prevented; nor is the circulation of the fluids interrupted so as to render the use of this bath in any degree dangerous;—a circumstance of the highest importance; because by the ordinary immersion, persons are often exposed to injuries which they least apprehend.

* * *

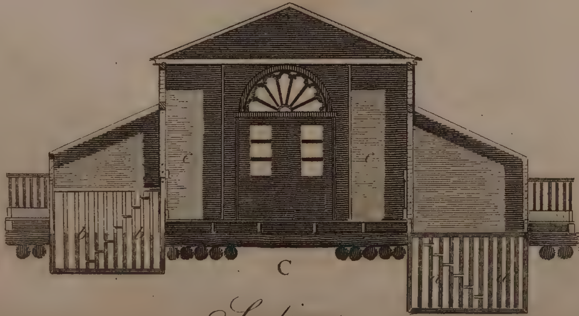
As the erection of public baths has, from the remotest ages, been considered an object worthy of national attention, and private solicitude, we have selected a modern specimen of such a structure as, in our opinion, will be admired, and perhaps adopted in this country, where public spirit, and a cordial support of every useful invention, are equally conspicuous. We allude to the FLOATING BATHS at HAMBURGH, an establishment which

Pl. I.

Elevation of the longitudinal Front

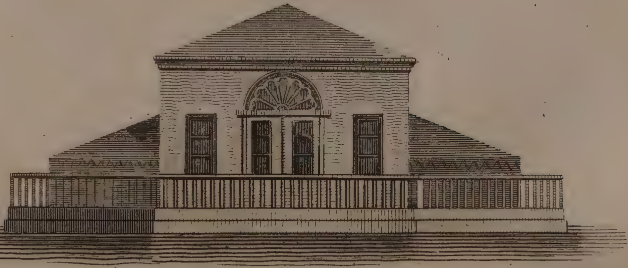


A



C

Section



B

Elevation of the transverse Side

which owes its origin to the enlightened members of the "Society for the Encouragement of Arts and Useful Trades," founded in that city, in the year 1765.

These baths were projected by Dr. Moldenhawer, physician at Hamburgh, and erected by public subscription, on a small lake of fresh water, called the *Alster*. M. Arens, an eminent architect of the same city, delineated the plan of the building, which, we are informed, is an improvement on similar baths established in the principal towns of the French republic.

Although we have not had an opportunity of comparing the *internal* construction of the Hamburgh baths, with those floating on the river Thames, near Westminster-bridge; yet we have reason to believe that they are essentially different from any other existing in this country. Induced by this consideration, and convinced of the intrinsic advantages which the former possess, independent of their beautiful external appearance, we have caused accurate representations to be copied from the original plates transmitted to us from Hamburgh, with this difference only, that ours are upon a reduced scale.

EXPLANATION

Of the Plates representing the Floating Baths erected in the City of Hamburgh.

Plate I.

A.—Elevation of the longitudinal Front of the Floating Bath, with its ornamental entrance; of the surrounding gallery, and the tents expanded over the bathing machines, and covered with sail-cloth which had been four times varnished. The wooden roof is also covered with strong sail-cloth, which had been repeatedly coated with tar. The whole vessel is 80 feet in length, and 40 in breadth.

B.—Elevation of the transverse side of the Floating Bath, with its glass doors and windows, through the former of which, the corridor, and through the latter, the cabins on each side receive their light.

C.—Section of the Building: namely, *a*, *b*, of the *Bathing Machines*; and *c*, *c*, of the chambers for undressing and dressing. On each longitudinal side of the vessel, there are (as appears on inspecting Plate II.) six of these *chambers*, which may be easily opened from within; and on each transverse side are two *lateral cabins*, partly furnished, and partly designed for store-rooms, to hold various implements.

The corridor, extending from one side-door to the other, within the centre of the building (See Pl. II. *B. f.*), is seven feet and a half wide; and on each side are the bathing machines and chambers.

These *chambers* for undressing and dressing, which are provided with sky-lights, and marked *c*, are seven feet and a half in length, and four feet wide. They are antichambers to the bathing machines *a*, *b*, and each of the former contains the most necessary articles of furniture, such as a table, chair, looking-glass, cork-couch (for supporting the feet till they are dried, after coming from the bath), pegs for suspending clothes, a boot-jack, &c.

The bathing machines *a*, *b*, below the surface of the water, consist of four sides, made of laths two inches thick, through which it flows, and they are provided with a solid wooden floor, secured by iron staples. These machines are six feet broad and seven long, so that the whole body may move in them without constraint.

Their construction renders them moveable, so that they may be raised or lowered at pleasure, and with little trouble, as appears from the machine *b*; while the impurities settled at the bottom may be easily removed. At the side of the steps (See Pl. II. *h*.), which extend to the bottom of the bathing machine, the latter is provided with a balluster (Pl. II. *i*.), adjacent to which is placed a table and chair. The bathing machines are adapted to different depths of water, so that every individual may regulate them at 2½, 3, 3½, or 4 feet in depth, and these proportions are marked within the chamber. Above each machine are suspended two strings, one of which is connected with a bell fixed in the corridor, for calling the waiter: by means of the other, the bathing person may exclude the current of air circulating between the bottom of the floating vessel and the surface of the water, as there is a wooden board which slides down for that purpose.

Plate II.

A.—Represents the construction of the floating vessel, which serves for the foundation of the building. It consists of strong double fir-beams, connected with each other by iron bolts and staples.

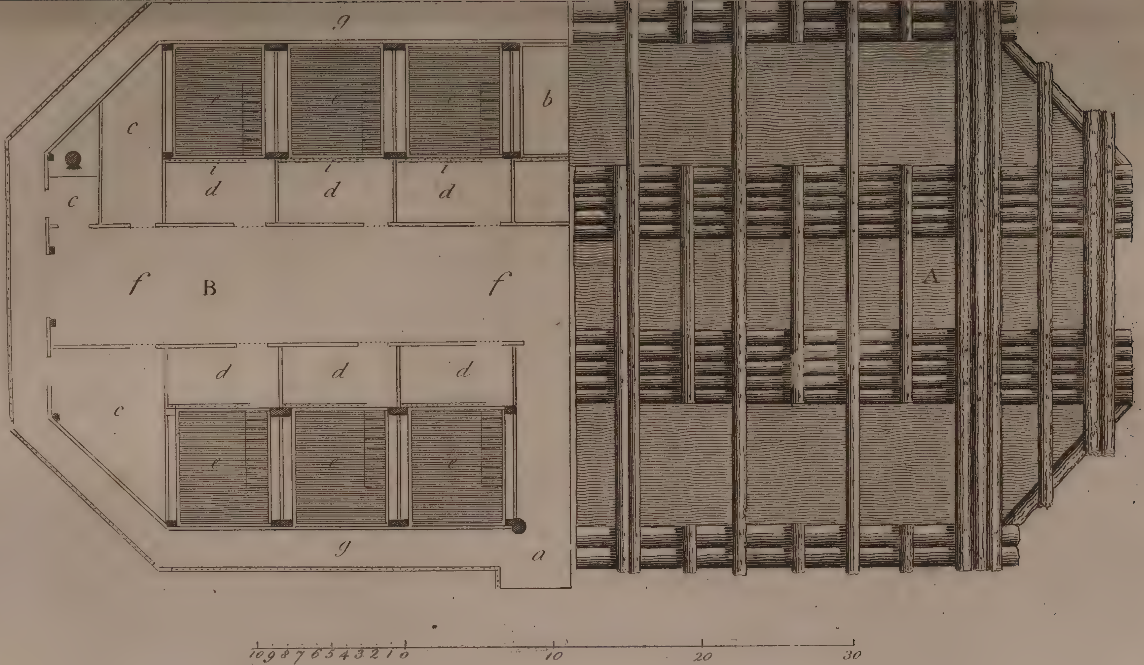
B.—Represents the *ground-plan* of one half of the floating vessel; *a*, the entrance: *b*, a room on the opposite side for the waiter, who is appointed to receive and deliver the admission tickets, &c.; *c*, the lateral cabins; *d*, the undressing and dressing chambers; *e*, the bathing machines; *f*, the corridor; *g*, the surrounding gallery; *h*, the stair-cases leading into the water; *i*, the ballusters at the bathing machines: all these parts have already been described in the explanation given of the first plate.

Cool Baths may be called those which are of a temperature between the 56th and 76th degrees of Fahrenheit's scale. They are of great service in all cases where cold bathing has before been recommended, and require nearly similar precautions. As their influence, however, on first entering them is less violent, though their subsequent effect may be attended with equal advantages, it follows, that even persons of a more delicate organization may resort to them with greater safety.

With respect to rules for cool bathing, we refer the reader to those already stated in the preceding analysis; and shall only remark, that notwithstanding its effects are less perceptible while the body continues in the water, it is necessary that the bather, on coming out of it, should be wiped dry with the greatest expedition, to prevent catarrhal affections.

Warm Baths, are such as have a temperature above the 76th, and not exceeding the 96th or 98th degree of the thermometer before-mentioned. There are various springs in Britain, especially those of Bath, Clifton, Buxton, and Matlock, to which Nature has given this temperature, the most beneficial to the human body. But whether the tepid bath of this description be natural or artifical, it is equally conducive to the restoration

2.



Floating Baths at Hamburgh.

of energy, though its effects have, till lately, been little understood. Physicians, as well as patients, have hitherto been too generally accustomed to consider a warm bath as weakening the body, and useful only for the removal of certain diseases, especially those of the skin. Experience, however, has amply proved, that there can be no safer and more efficacious remedy in a variety of chronic or inveterate complaints, than the warm bath, if properly used, and continued for a sufficient length of time. Dr. MARCARD, resident physician of Pyrmont, has, in our opinion, satisfactorily demonstrated, that the *warm* bath, in many cases of debility, from spasms, pain, anxiety, and other causes, as well as to hectic and emaciated persons, is, *generally*, of eminent service, and almost the only means of restoring their health, and prolonging their lives. Instead of *heating* the human body, as has erroneously been asserted, the warm bath has a cooling effect, inasmuch as it obviously abates the quickness of the pulse, and reduces the pulsations in a remarkable degree, according to the length of time the patient continues in the water. After the body has been over-heated by fatigue from travelling, violent exercise, or from whatever cause, and likewise after great exertion or perturbation of mind, a tepid bath is excellently calculated to invigorate the whole system, while it allays those tempestuous and irregular motions, which otherwise prey upon, and at length reduce, the constitution to a sick-bed. Its softening and assuasive power greatly tends to promote the growth of the body; on which account it is peculiarly adapted to the state of such youth as manifest a premature disposition to arrive at a settled period of growth: and it has uniformly been observed to produce this singular effect, in all climates.

The warm bath is of very great utility to such individuals as are troubled with a parched and rough skin; it has also been found to afford relief in many paralytic, bilious, hypochondriacal, hysteric, and even insane cases, as well as to forward the cure of scorbutic and leprous eruptions, when strict attention had been paid to both diet and regimen. In palsy, likewise, modern observers assert, that warm bathing is one of the most effectual remedies; though the late Dr. MEAD expressly maintained, that it is prejudicial to all paralytics.—Dr. CHARLETON, of Bath, was the first who refuted this assertion; because he had seen, in the hospital of that city, numerous and manifest proofs of its efficacy in paralytic cases. This judicious physician remarks, in his "*Inquiry into the Efficacy of Warm Bathing in Palsies*," printed in 1770, that he was induced to turn his attention to this subject, by the prevalence and increase of *nervous* diseases, but particularly on account of the *palsy*, which formerly used to be the attendant of the aged, but has now become the too frequent and miserable companion of youth. Of 996 paralytics, most of whom had resisted the powers of medicine, 813 were benefited by the proper application of the warm bath.—It is perhaps necessary to remind the reader, that this desirable effect may be derived from the waters of Bath (of which we shall treat in a subsequent article), as well as from every other bath, whether furnished by Nature or

Art, provided its temperature does not exceed 98°. We have purposely inserted Dr. CHARLETON's account under the head of "Warm Baths," though the waters in the city of Bath must, consistently with our division, be classed under the following head.

4. *Hot Baths* are those which have a temperature above 98 or 100 degrees of FARENHEIT, and are occasionally increased to 110 or 120° and upwards, according to the particular nature of the case, and the constitution of the patient. As no prudent person, we trust, will have recourse to a *hot* bath, without medical advice, we shall but briefly enumerate a few particulars relative to its use, as well as its effects.

1. Hot bathing, whether natural or artificial, is supposed to be the most general solvent of all the humours of the body; 2. It consequently is the most probable mean of removing obstructions of every kind; 3. Previous evacuations are necessary, to cleanse the first passages, and prepare the habit; for which purpose repeated emetics are often safe and useful; 4. Attenuating and aperitive medicines are proper to render the humours more fluid, and promote the discharge of noxious particles and whatever caused the obstructions; 5. Too great a degree of heat, or too long a continuance in the bath; too heating a bed after it; profuse perspiration; exposure to cold air on bathing days; eating of high seasoned dishes, or drinking of spirituous liquors, during a course of bathing, are always improper, often dangerous, and sometimes fatal; 6. The head should in no case be dipt, till the bather is rising out of the water; 7. A course of bathing should be long, but regulated by intervals, according to the various effects perceived by the bather; 8. The temperate seasons of the year are most proper, safe, and beneficial, both for drinking and bathing. On the whole, there can be no stated rules laid down, as every thing depends upon the peculiar circumstances of each patient; and hence Dr. OLIVER asserts, in his "*Practical Essay on the use and abuse of Warm* (hot) *Bathing, &c.*" that by the prudent use of the hot bath, most chronical disorders, and gouty cases in particular, *not in an inflamed state*, may be relieved, and sometimes cured; while persons in high health may be greatly injured by wantonly sporting with so powerful an *alterative* of the animal machine, either from sickness to health, or from health to sickness.

Having now given a concise view of the four principal kinds of bath, with regard to the temperature of the water, we shall likewise notice another curious mode of bathing, as practised by the hardy Russians.—We allude to the *Sweating* or *Vapour Baths*, which are used by persons of every rank and age, in almost every disorder; before and after a journey, hard work, &c. These are frequented at least once a week, or as often as possible, whether in a state of health or sickness: the extraordinary degree of heat produced by the evaporation of water thrown upon red-hot stones, in a close room, raises the thermometer to 146, or 168 degrees; the latter of which numbers is a degree of heat considerably above that which melts wax, and only 12° below that for boiling spirit of wine. In such a bath, the Russians lie naked on a bench, and continue there, notwithstanding a profuse perspiration, sometimes for two hours, occasionally pouring hot water over their bodies: thus some, with a view to promote perspiration, and completely to open the pores, are first rubbed, and then gently flagellated with leafy branches of birch; while others wash their bodies with warm or cold water; and all of them at length plunge over head in a large tub of water. Many, however, rush out almost dissolved in sweat; and either throw themselves immediately from the bath-room into the adjoining river, or, in winter, roll themselves in snow during the most piercing cold, without suffering any inconvenience, and probably with advantage; for we understand that rheumatisms are scarcely known in Russia; and there is great reason to attribute this exemption to the use of the vapour-bath. Indeed, they differ from all the *balnea* of antiquity, as well as from those of the modern Orientals, in the circumstance of not being *dry* sweating-baths; whence their peculiar excellence in many cases where *hot* water-baths would be inefficacious, or even hurtful. By exciting an unusual degree of perspiration, they promote cleanliness, while they render the skin soft and smooth: hence, again, they cannot be compared to the voluptuous baths of the Greeks and Romans; because all the consequences of effeminacy and luxury are here completely obviated. From the prejudices imbibed during a soft and effeminate education, this sudden transition from heat to intense cold, appears to us unnatural and dangerous; but it certainly hardens the body of the Russian, and enables him to brave all the vicissitudes of the weather, and all the severities of his climate.

To conclude this interesting subject, we shall avail ourselves of a few additional observations, extracted from a late work of acknowledged merit, entitled, "*A View of the Russian Empire,* &c." (in three vols. 8vo. London, 1799, price 1l. 7s. boards), by the Rev. W. TOOKE, who resided many years in that country; and to whose sentiments we cordially subscribe.

"It is not to be doubted that the Russians owe their longevity, their robust state of health, their little disposition to certain mortal diseases, and their happy and chearful temper, mostly to these baths; though climate, aliment, and habits of living, likewise contribute their share.—The great lord chancellor BACON, and other sagacious observers of nature and of mankind, have lamented, and certainly not without cause, that this bathing has fallen into disuse among the modern nations of Europe, and justly wish the practice back again in all our towns and villages. In fact, when we consider that the old physicians so early introduced into their practice this remedy of Nature's own invention, and employed it with such great success; when we recollect that Rome, for five hundred years together, had no physicians, but only baths, and that to this day a multitude of nations cure almost all their maladies merely by baths; we cannot avoid regarding the dismission of them as the epocha of a grand revolution which has been wrought in the physical state of the human race, in our quarter of the world.

"The natural perspiration, the most important of all excretions, must naturally go on better in a body constantly kept soft by bathing. A great number of impurities which privily lay in us, the train to tedious and dangerous distempers, are timely removed, ere they poison the blood and the juices.—All exanthematic diseases are abated by bathing, consequently then the small-pox; and if this dreadful disorder be actually less fatal in Russia than in other countries, this phenomenon need not be attributed to any other cause than the vapour-baths."

BATHING, in general, signifies the act of immersing the body, or part of it, into water, or any other fluid; and is a practice coeval with mankind.

The ancient Greeks, Romans, and Germans, as well as the Persians, Turks, and especially the modern Egyptians, enjoy the comforts and luxuries procured by bathing, in a degree of which we can scarcely form an adequate conception. Those who wish to amuse themselves with reading one of the most animated, nay, almost enchanting accounts relative to this subject, we must refer to M. SAVARY's "*Letters on Egypt*." From these it appears, that bathing is employed by those voluptuaries, not only for procuring the most delightful sensations, and removing that irksomeness and apathy which is the general concomitant of an idle or sensual life, but likewise with a view to prevent or cure rheumatisms, catarrhs, or such cutaneous diseases as their climate produces, by an atmosphere loaded with humid and impure exhalations, and highly unfavourable to insensible perspiration. The Egyptian baths are said to be heated by the steam of water artificially combined with odoriferous fumes, which penetrate into all the pores, so that they are, in some degree, similar to those of the Russians, before described. And though M. TOURNEFORT is of opinion that vapour-baths have a tendency to injure the organs of respiration, yet if credit be due to SAVARY, there are no people on earth who are less troubled with asthmatic complaints than the Egyptians; and few nations so passionately fond of such bathing. In short, we cannot suppress the remarks formerly made on this important branch of dietetic regimen, that, "though the ancients could less dispense with the use of the bath, on account of the frequency of their athletic exercises, as well as from the want of linen, which was then much less in use than at present, yet in our times, it would be of great service, if the use of baths were more general and frequent, and this beneficial practice not confined to particular places or seasons, as a mere matter of fashion. Considered as a species of universal domestic remedy, as one which forms the basis of cleanliness, bathing, in its different forms, may be pronounced one of the most extensive and beneficial restorers of health and vigour."

BATHS *(Dry)* were formerly made of ashes, salt, sand, shreds of leather, and similar substances.—CELSUS informs us, that the ancients had a variety of sweating-baths by a dry heat, and especially by certain steams naturally emitted from the earth, and received under a proper arch or hot-house; or sometimes by means of hot sand, stove-rooms, or artificial bagnios. Of the last mentioned establishment we have already given a short account, under the head of *Bagnio*;

and we shall here only caution the reader against their improper use, on the authority of Dr. ARBUTHNOT, who says, in his excellent work "*On the Effects of Air on Human Bodies*," (8vo. 3s. 6d.) that he has seen two instances of malignant fevers produced by the hot air of a bagnio.

Although many cases are recorded by medical and other authors, from which it appears that *dry-baths* have often been found beneficial in removing obstinate pains in the limbs, and even curing that odious disorder which salivation cannot always remove, yet we have reason to doubt their efficacy, when unassisted by internal medicines. In such cases as rheumatism, gout, palsy, &c. where profuse perspiration is necessary, as it were, to expel the malignant morbid humours, there is no occasion for resorting to the precarious use of *dry*-baths; we would, therefore, preferably recommend the *Prussian Vapour Bath*, which was lately used in the army of that kingdom, with almost general success. It simply consists of a close wooden box, the lower part of which resembles a common night-chair, in which is placed a large vessel with boiling water: the upper compartment has only one aperture on the top, opening with two horizontal doors, having in the centre an excision large enough to admit a person's neck with ease. In such a box the patient is placed for one, two, or three hours, according to the nature of his case, and the degree of perspiration deemed necessary.—There can be no reasonable objection against this simple contrivance, which, with a few improvements, deserves to be adopted in the British army, and especially in the navy, where want of room, and other circumstances, might render it, on many occasions, extremely useful.

BATHS *(Medicated)*, are those saturated with various mineral, vegetable, or sometimes animal substances. Thus we have sulphur and steel baths, aromatic and milk baths;—there can be no doubt, that such ingredients, if duly mixed, and a proper temperature be given to the water, may, in certain complaints, be productive of effects highly beneficial. We well remember the pompous reports published several years ago, by two notorious empirics, and attested by many of our first nobility, who permitted their names to be bandied about publicly, in consequence of wonderful cures said to have been performed by the most whimsical combinations of things and circumstances. Although we are not inclined to question the truth of these specious cures, yet, it is remarkable, that such extraordinary facts, if they were facts, should, in the course of a few years, so far from being improved upon, and rendered of practical service to suffering humanity, have been totally consigned to oblivion. Like fiery meteors, those mysterious masters of the healing art, their medicines and patients, all have disappeared. Such seems to be the universal fate of human pursuits, when involved in mystery; and as the practitioners thus engaged, carried on their secret trade in an *empirical* manner, without being able sufficiently to distinguish between the nature of different cases, and the constitutions of the unwary victims of disease, they had recourse (as quacks are always obliged to have) to an *indiscriminate* administration of their medicated baths; a precarious practice, which could not fail to diminish the number of cures, and to reduce their ill-acquired reputation. Notwithstanding this unfavourable result, it would be unreasonable to impute the want of *farther* success to the inefficacy of medicinal substances, or the baths themselves; on the contrary, we venture to pronounce, that both will operate, when properly used, in an uniform manner, so long as the nature of man, and diseases, are conformable to general laws. Hence our success will always less depend upon the specific *virtues* of substances, or drugs, than upon the *manner* in which they are used for particular purposes.

Water impregnated with the scales or rust of iron, which abound with the saline and sulphureous particles of that metal, is of great service for strengthening the part to which it is applied; re-invigorating debilitated limbs; stopping various kinds of bleeding; restoring the menstrual and hemorrhoidal discharges, when obstructed; and, in short, as a substitute for the natural iron-bath. In the vicinity of smelting works, large quantities of the slag of copper, antimony, and cobalt, are generally thrown away as useless; but these substances contain a considerable proportion of sulphur and vitriolic acid, combined with an earthy base, which renders them valuable in baths designed for bracing and giving tone to the weak fibres, or relaxing them when they are preternaturally rigid. Besides, such baths are possessed of detersive properties, so that they may be used with advantage in many cases, if due regard be paid to those circumstances which we have pointed out under the head *Cold Baths*. In preparing such artificial baths, however, the slags ought to be thrown into the water immediately after they are taken from the furnace, or they should be previously heated: these preparations may then be used, occasionally, either in the form of baths, or fomentations.

There are various other medicated baths, such as those saturated with alum and quick-lime, sal ammoniac, &c. by boiling them together or separately in pure rain water: they have long been reputed as eminently serviceable in paralytic and all diseases arising from nervous and muscular debility.—Lastly, it is worthy of remark, that all mineral waters presented to us by the beneficent hand of Nature, may be artificially prepared, with tolerable accuracy, and sometimes of superior efficacy, when we are sufficiently acquainted with the component parts of such springs.

BATH-WATERS are celebrated on account of their having a higher temperature than any other in Britain, and being the only springs which are sensibly hot to the touch. All other *thermal* waters of this island are below the animal temperature, and deserve that appellation only, from being invariably warmer than common springs are in general.

By the erection of elegant baths, these waters are particularly adapted to the benefit of invalids, who find here a variety of establishments, contributing equally to health, convenience, and amusement.

There are three principal springs in the city of Bath, namely, those called the King's Bath, the Cross Bath, and the Hot Bath; all within a short distance of each other, and emptying themselves into the river Avon, after having passed through the several baths. Their supply is so copious, that all the large reservoirs used for bathing, are filled every evening with fresh water, from their respective fountains. In their sensible and medicinal properties, there is but a slight difference: according to Dr. FALCONER, the former are, 1. That the water, when newly drawn, appears clear and colourless, remains perfectly inactive, without bubbles, or any sign of briskness or effervescence; 2. After being exposed to the open air for some hours, it becomes rather turbid, by the separation of a pale yellow, ochery precipitate, which gradually subsides; 3. No odour is perceptible from a glass of the fresh water, but a slight pungency to the taste from a large mass of it, when fresh drawn; which, however, is neither fetid nor sulphureous; 4. When hot from the pump, it affects the mouth with a strong chalybeate impression, without being of a saline or pungent taste; and 5. On growing cold, the chalybeate taste is entirely lost, leaving only a very slight sensation on the tongue, by which it can scarcely be distinguished from common hard spring water.

In *specific gravity*, the water of the King's, or Hot Bath, and that of the Cross Bath, exceed all other cold or warm springs of that city; the former being one-tenth, and the latter one-twelfth part of a thousand, heavier than the water in the river Avon.

The temperature of the King's Bath water, which is usually preferred for drinking, is, when fresh drawn in the glass, above 116°.; that of the Cross Bath 112°. But after flowing into the spacious bathing vessels, it is generally from 100 to 106° in the hotter baths, and from 92 to 94° in the Cross Bath; a temperature which remains nearly stationary, and is greater than that of any other natural spring in Britain. A small quantity of gas is also disengaged from these waters, which Dr. PRIESTLEY first discovered to contain no more than one-twentieth part of its bulk of fixed air, or carbonic acid. It would be foreign to our plan, to expatiate upon the chemical properties of the Bath waters, which have been so ably analyzed by the ingenuity of Drs. LUCAS, FALCONER, and GIBBS, to whose description we refer: we shall here only remark, that they contain so small a proportion of iron, as to amount only to 1-20th or 1-38th of a grain in the pint; and, according to Dr. GIBBS, $15\frac{1}{4}$ grains of siliceous earth, in the gallon.

Dr. SAUNDERS, of London, from whose valuable work "*On Mineral Waters*," lately published (8vo. 8s. boards), we have extracted the preceding facts, estimates a gallon of the King's Bath water to contain about eight cubic inches of carbonic acid, and a similar quantity of air, nearly azotic; farther, about 80 grains of solid ingredients, one-half of which probably consist of sulphat and muriat of soda; $15\frac{1}{2}$ grains of siliceous earth, and the remainder is selenite, carbonate of lime, and so small a portion of oxyd of iron, as to be scarcely calculable. Hence he concludes, that the King's Bath water is the strongest chalybeate; next in order, the Hot Bath water; and lastly, that of the Cross Bath, which contains the smallest proportions of chalybeate, gaseous, and saline, but considerably more of the earthy particles; while its water in the pump is also two degrees lower than that of the others. It is likewise now ascertained, that these springs do not exhibit the slightest traces of *sulphur*, though it was formerly believed, and erroneously supported on the authority of Dr. Charleton, that the subtile *aromatic balsam* in the Bath waters was a sulphureous principle, entirely dissimilar to common *brimstone*.

With regard to the medicinal effect of the Bath waters, we fully agree with the experienced Dr. Saunders (though we may differ from all the resident physicians), that much of their salubrious influence is owing to the natural degree of *warmth* peculiar to these springs; which, for ages, have preserved an admirable *uniformity* of temperature; that one of the most important uses, is their *external* application; and that, in this respect, they do not appear to differ from common water, when heated to the same temperature, and applied under similar circumstances.

According to Dr. Falconer, the Bath water, when drunk fresh from the spring, generally raises, or rather accelerates the pulse, increases the heat, and promotes the different secretions. These symptoms, in most cases, become perceptible soon after drinking it, and will sometimes continue for a considerable time: it is, however, remarkable, that they are only produced in invalids. Hence we may conclude, that these waters not only possess heating properties, but their internal use is likewise attended with a peculiar stimulus, acting more immediately on the nerves.

One of the most salutary effects of the Bath water, consists in its action on the urinary organs, even when taken in moderate doses. Its operation on the bowels varies in different individuals, like that of all other waters which do not contain any cathartic salt; but, in general, it is productive of costiveness, an effect resulting from the want of an active stimulus to the intestines, and probably also from the determination this water occasions to the skin, more than from any astringency which it may possess. For, if perspiration be suddenly checked during the use of it, a diarrhœa is sometimes the consequence. Hence it appears that its stimulant powers are primarily, and more particularly exerted in the stomach, where it produces a variety of symptoms, sometimes slight and transient, but occasionally so considerable and permanent, as to require it to be discontinued. In those individuals with whom it is likely to agree, and prove beneficial, the Bath waters excite, at first, an agreeable glowing sensation in the stomach, which is speedily followed by an increase of both appetite and spirits, as well as a quick secretion of urine. In others, where the use of them is attended with head-ach, thirst, and constant dryness of the tongue, heaviness, loathing of the stomach, and sickness, or, if they are not evacuated, either by urine, or an increased perspiration, it may be justly inferred, that their farther continuance is improper.

To conclude: many patients and invalids are apt to desist from the *internal* use of the Bath water, as soon as they perceive that it raises the pulse, and excites a preternatural degree of heat, with other symptoms of fever. On such occasions, however, medical men ought to be consulted; that they may determine, whether these effects are to be ascribed to a favourable effort of Nature, by which she endeavours to expel something from the body, that is incompatible with its healthy state. And as there is an essential difference between a spontaneous fever, and one occasioned by accident, or intemperance, it will next be necessary to consider, how far the latter be accompanied with inflammatory symptoms, which ought to be counteracted by the aid of Art; or whether the whole should be attributed to a beneficial crisis, effected by the use of the waters, and in the progress of which Nature should be assisted, rather than interrupted.

BAY-SALT, a kind of brownish impure salt, manufactured in France, Italy, and other countries, by evaporating sea-water in clay-pits; which is effected at a small expence, and with little trouble.

This salt is more or less adapted to all domestic uses, and forms a profitable article of commerce, as it is exported in large quantities. According to the clay employed in making the pits, it acquires different shades of colour; and, in favourable seasons, the French manufacture not only what is wanted for home consumption, but likewise considerable quantities for exportation. The greatest difficulty which attends the making of bay-salt in England, arises from a deficiency of heat in summer; because here the rays of the sun are not powerful enough to evaporate a large mass of sea-water in a certain time. However, the practicability of imitating the French, in the preparation of this article, has been clearly proved by Dr. BROWNRIGG. Such of our readers as are desirous of information on this subject, we refer to his pamphlet; from which copious extracts, together with remarks, have been inserted in the first volume of the "*Museum Rusticum et Commerciale*," p. 272; a work published in the year 1764, and well known to rural economists.

BAY-TREE, or *Laurus*, L. is an elegant tree, of which there are ten species; but none of these being indigenous, we shall in this place give an account of those only, which may perhaps in this country be cultivated with advantage; namely,

1. The *Laurus nobilis*, L. or Evergreen Bay, is a native of Italy, with an upright trunk, branching out on every side. It may be propagated, either by layers, or by the berries. When the former are transplanted, in a dry season, they require to be constantly watered. To raise this tree from the berries, they ought to hang till about January, before they are gathered, and to be sown shortly afterwards, in a fine mould. They should be guarded from black frosts while young, by placing furze bushes between the drills. HANBURY asserts, that this species thrives exceedingly well on the hottest gravelly lands; and, after having overcome the hardships of transplanting, it will grow in such situations remarkably fast, and attain a considerable size.

The dark-green leaves of this tree afford, by distillation, a very useful oil, which is employed, both in medicine, and as a culinary spice. The fragrant, but bitter berries, also yield an essential oil, and in a much greater proportion: it has sometimes been used with advantage in nervous and paralytic affections. With the foliage of this beautiful tree, which, among the ancients, was consecrated to APOLLO, they crowned their poets and heroes.

2. The *Laurus æstivalis*, or Deciduous Bay, a native of North America. It rises with an upright stem, covered with a purplish bark, and has oblong, oval, deciduous leaves.

3. The *Laurus Benzoë*, L. or Benjamin-Tree, which grows fifteen or twenty feet high: and

4. The *Sassafras*; both species are also natives of America. They may be cultivated by the seed, preserved in sand, and sown early in spring, one inch deep, in large pots. They require a soil taken from a rich pasture, with the sward, at least one year before it is used. Nothing more than weeding will be necessary; which must be constantly practised during the summer. About the middle of March, the pots should be taken up, and placed in a good hot-bed; soon after which the buds will appear. Weeding and watering should still be attended to; and at the approach of cold weather, in autumn, they should be sheltered under a frame, and replaced in the hot-beds, in the ensuing spring. After having been thus managed for three years, they should be taken out of the pots, and planted in the nursery-ground, where they may remain till strong enough to be finally transplanted. Such plants may also be increased by layers, but very slowly, as three or four years will elapse, before they take proper root. The young twigs should be laid in the ground in autumn; and, by twisting a wire around the buds, so as to stop, in some degree, the circulation of the sap, and stripping off a little of the bark with a knife, it has been found that they speedily acquire firm roots.

EVELYN asserts, that he has seen bay-trees near thirty feet high, and almost two feet in diameter: and HANBURY ranges the bay among his forest-trees.

Professor KALMS, in his travels through America, informs us, that the bark of the species called *Sassafras* is used by the women of Pennsylvania, for dyeing worsted of a permanent and beautiful orange-colour, which is not affected by the rays of the sun. They make use of urine instead of alum, in preparing this dye, which is boiled in brass vessels: the wood is employed for posts of inclosures, because it is found to last a long time in the ground; but, when exposed to the air and rain, there is scarcely any timber more subject to be destroyed by worms. The same writer informs us, that the Sassafras root is frequently peeled, and put into beer, while brewing; and also into brandy. A decoction of the root in water, drunk every morning, has, according to him, been used with success in the dropsy.

4. The *Laurus Cinnamomum*, L. or Cinnamon-Tree, is a native of Ceylon; has a large branchy root, which is hard and white, without smell: its trunk grows to the height of twenty feet, or upwards, and, together with its numerous branches, is covered with a bark, which is first green, but turns red before it arrives at perfection. The leaf is longer and narrower than the common bay-tree: when first unfolded, it is of a flame colour, but gradually changes to a deep green, on the upper surface, and becomes

lighter on the lower. The flowers are small, white, and grow in large bunches; they impart an agreeable odour, similar to that of the lily of the valley. The fruit is shaped like an acorn, but of a smaller size.

With respect to the culture, or propagation of this valuable tree, in its native place, we possess no particular account; but it is now become of importance to us, since it has been introduced into our colonies.

According to the account given by Dr. Wright, its propagation is very easy, and its culture requires but little care. Dr. Dancer asserts, that the tree puts out numerous side-branches, with a dense foliage, from the very bottom of the trunk: this furnishes an opportunity of obtaining a sufficiency of layers, and facilitating the growth of the tree, which does not perfect its seeds in any quantity under six or seven years, when it becomes abundantly loaded. It seems to delight in a loose, moist soil, and to require a southern aspect: the trees thus planted, flourish better than others which grow in loam, and are not so much exposed to the sun. When healthy, it is reared from layers of a pretty quick growth, attaining, in eight years, the height of fifteen or twenty feet.

The cinnamon-tree, with other valuable plants, was taken in a French ship by Admiral Rodney, in the last war; and presented to the Assembly of Jamaica. From this parent-tree, several hundred of young plants are already produced, and transplanted in different parts of the island; in all of which it thrives luxuriantly, and will soon be a valuable addition to our commerce. In this country, it requires to be treated like other green-house plants, or rather as a stove-plant.

The best cinnamon bark taken from the trees growing in Jamaica, is that from the branch, of about an inch in diameter; as the larger ones do not yield so good a spice. It is the inner rind that constitutes the cinnamon, from which the two external coats must be separated.

Cinnamon, though more retentive of its properties than any of the other spices, yet requires to be excluded from the air and moisture. The leaves of this tree, whether fresh or dried, are strongly aromatic, and afford a good substitute for the bark, both in cookery and medicine. In distillation, they yield a fragrant spirituous water, and an essential oil: when reduced to powder, they form a good perfume.

5. The *Laurus Cassia*, L. or Base Cinnamon, has lanceolated leaves, triple nerved. The bark of this species is imported from different parts of the East Indies, and from China. It resembles cinnamon more in its aromatic flavour than in external appearance; as it is thicker and coarser: it farther differs from it, in being weaker, abounding more with a viscid mucilaginous matter, and being less astringent; as likewise by its breaking short and smooth; while the cinnamon breaks fibrous and splintery.

6. The *Laurus Camphora*, L. or Camphor-Tree, grows wild in the western woods of Japan, and in the adjacent isles. The root of this tree smells stronger of camphor than any other part, and yields it in greater abundance. This is another of the captured plants presented to the inhabitants of Jamaica; and, if cultivated with

care, will also be a beneficial acquisition.

The Abbe GROSIER informs us, that in China this tree grows to above 150 feet high, and more than forty yards in circumference. The camphor is obtained by lopping the branches, which the Chinese chop very small, steep in spring water for three days, and afterwards purify the sap by boiling.

7. The *Laurus Persea*, L. or the Alligator pear-tree, is another species of the bay, which is generally cultivated in the West Indies. It rises to a considerable height, with a straight trunk; the bark is of a greyish colour; the leaves of a beautiful green. Its fruit is pear-shaped, and from one to two pounds weight. It affords an agreeable article of diet to the negroes, and with a little salt and a plantain, furnishes a nourishing repast.—When the pear is ripe, its pulp is harder than butter; and from its similarity in taste to that animal oil, it is called vegetable marrow.

There are several other species of the bay-tree, which we shall not enumerate, as they are of inferior value, and consequently less interesting.

BEAN, or *Vicia*, L. a genus of plants, of which there are four species commonly reared in the gardens of this country: 1. The small *Lisbon*, or *Magazan*; 2. The *Spanish*; 3. The *Sandwich*; and 4. The Windsor beans. The Magazan beans are esteemed either for the table or cattle; they are as palatable as the Windsor, and should be cultivated in a loamy soil, in rows nearly a yard distant from each other, and about four inches in depth: the first crop ought to be set about the latter end of November; the second in December; and the others in January, February and March, but not so thick as the former.

If the rows should appear too thin, some may be transplanted from those which are thicker, but all ought to stand four inches distant from each other, and afterwards to be moulded and Dutch-hoed during the summer.

In the beginning of May, the first sown beans will blossom from the bottom to the top, even if they rise to the height of three feet; they grow strong, and send three or four stalks from one root, but should never be lopped, as this would prevent the pods from arriving at their full growth.

When ripe, they should be pulled, and set upright to dry, and may afterwards be split; in which state they are excellent food for horses and swine. The bean-straw is also beneficial, as the produce of ten acres, when cut to chaff with a three-knife machine, will supply sufficient nourishment for ten cows and two calves, for twenty weeks. A man is able to cut as much in twelve hours, as twelve head of cattle can eat in a week. Cows, when kept on this food alone, will eat about 25lb. a day.

Spanish Beans should be planted in October and November, sheltered by walls or hedges, where, if they survive the severity of the season, they will come to perfection early in summer. They may also be raised very close in beds, if covered with mats in winter, and transplanted in spring.

The *Lisbon Bean* is preferred to the Spanish; but as it is apt to degenerate, by ripening early, though not in any perfection, fresh seed ought to be imported every two years. The Spanish and Windsor beans, which are those generally used at table, should not be planted till after Christmas, but especially the Windsor, which are more liable to injury from cold than any other kind. These beans require an open ground, and should be set at the distance of three feet and a half between the rows, and five or six inches from each other.

The *Sandwich Beans* are hardier than the Windsor, and may be planted so early as to be fit for use between these and the early crops. This species, however, has lately been much neglected. Windsor beans should first be set about the middle of January, and a new plantation made every three weeks, till the middle of May, to ensure a succession of crops. Another kind much planted at present, on account of its great produce, is the *Toker*; it comes to perfection about the same time as the Sandwich. The black and white blossomed beans are also much esteemed; but unless their seeds be preserved with care, they are apt to degenerate.

The *Horse Bean* is the only kind propagated by the plough. It delights in a stiff and moist clay; three bushels are sufficient to sow an acre, which ought to be performed in February; and the general produce of an acre is about twenty bushels. But it is worthy of remark, that by the new improvements in husbandry, less than one bushel of seed is sufficient to plant an acre of land, and the produce has sometimes been found to exceed that of the old method, by ten bushels per acre. The beans should lie some time upon the ground after they are cut. To keep the soil clean from weeds, when intended for a crop of beans the next year, dung should be laid on the land as soon as the wheat stubble, or haulm, is carried off; this method having been found more effectual in preventing the growth of weeds, than by ploughing in the haulm, and laying the dung upon fallow lands.

As soon as the beans have acquired six leaves, sheep should be turned in, to feed among them; they will eat all the young weeds, even the melilot, but will not hurt the beans, provided they are not suffered to lie down.

A writer in the Gentleman's Magazine for 1764, recommends the planting of horse beans by the following method:—Take a plank of oak, of such a size as a man can easily manage by a handle fixed upright in the middle of it, and of such thickness as not to give way in working; in the under part of this plank let there be fixed wooden pegs of such length, and at such distance from each other, as may form proper holes or beds in the ground for the beans.

When the land has been properly prepared, the workman must thrust the pegs of this instrument into the ground, and proceed sideways, managing it so, that there may be the same distance between the last row of holes made by the first impression, and the first row made by the next, as there is between the rows of any one impression. The youngest children may be taught to follow the instrument, and drop a bean into every hole that it makes.

As the topmost blossoms seldom come to perfection, they should be taken away when those toward the bottom of the stalks first appear, which may be done by garden shears with long handles: the furrows being left wide enough for a careful person to walk in them, without damaging the crop; and the cuttings, by covering the ground, will shade it, keep it moist, and gradually be converted into manure, which, as strong lands are apt to chap, and such only being fit for beans, will be of great utility.

Beans intended for seed, should be plucked up by the roots, before they are quite ripe, instead of cutting the stalks: thus they will receive nourishment enough after being removed, to ripen fully, and no seed will be lost; which otherwise happens to a great quantity, in their cutting and removal.

Beans have long been used by our most celebrated agriculturists, as a preparatory crop for wheat-lands. The beneficial effects of this method are so well known, that it is unnecessary to expatiate upon the subject. We must, however, observe, that in the year 1795, the Society for the Encouragement of the Arts, adjudged a premium of twenty guineas to LEWIS MAJENDIE, Esq. an ingenious improver of rural economy (whose successful exertions in planting ash, we have noticed in p. 123), for his judicious culture of beans and wheat. He sowed fifteen acres in February, 1794, with the *Vicia faba equina*, or small horse bean. The quantity of seed was six pecks to the acre; and the total expence 29l. 14s. 3d. or 1l. 19s. 7¼d. per acre. The produce was fifty-nine quarters and one bushel, which were sold for 120l. 11s. and 6d. A detailed account of this interesting experiment, may be seen in the fourteenth volume of the Society's Transactions.

In the year 1796, Mr. JOSEPH WEBSTER, of Bankside, near Doncaster, received a similar premium from the Society, for having drilled sixteen acres of land with beans, and sown it with wheat in the same year. He employed COOKE's Drill Machine, and the beans were of the same species as those sown by Mr. MAJENDIE.

Another premium was also given to Mr. ROBERT DUDGEON, of Tynningham, who, in the spring of 1797, drilled three fields, containing nearly twenty-three acres and a half, with beans, and sowed them with wheat in the same year. This process is described, at considerable length, with several interesting remarks, in the seventeenth volume of the above-mentioned work.

The Duke of GRAFTON, about eleven years since, made an experiment, to ascertain whether the soil of the common fields of Northamptonshire, and the adjacent counties, would alternately bear a crop of wheat and beans, for a series of years; after giving it a light dressing of dung, namely, from twelve to fifteen loads per acre, every third year, without rendering the land poorer than it was when first cultivated for this purpose. After having manured the field in the manner specified, the Duke, in the first year, sowed one half of it with wheat, and the other half with beans. The success of this plan was so great, that in a letter to ARTHUR YOUNG, Esq. dated August 1799, he observes, he has continued this alternate course of crops ever since, without having in a single instance admitted a fallow.

Having stated these useful and interesting facts, we shall submit the practical application to the judgment of the reader. But the last-mentioned experiment by no means proves, that a summer fallow may not, on some particular lands, be of great advantage to ensure a succession of crops.

With respect to the properties of beans, in general, they are nutritive, but tend to produce flatulency. Hence they ought to be boiled in their fresh state, when they are less flatulent, and more easily digested. The horse bean has been used as a substitute for coffee, which it much resembles in taste, though it does not contain more than half the quantity of oil.

French Beans, when eaten before they attain to maturity, are equally palatable and wholesome; and, if ground and mixed with wheaten flour, they would, like other beans or pease, make a good and nourishing bread;—yet the *daily* use of it is apt to produce costiveness, and otherwise to disorder the alimentary canal.

Bean Flour, as Dr. Darwin observes, is probably more nutritive than that of oats; which appears by its effect in fattening hogs: and, from the relative prices of these articles, he is of opinion, that pease and beans in general supply a cheaper provender for horses and other animals. But, as the flour of beans and pease is more oily than that of oats, it must be more difficult of digestion. Hence, when a horse has been fed with pulse, he will be less active for an hour or two afterwards, than if he had eaten oats. It will, therefore, be advisable to mix pollard, or straw finely cut, with pease and beans, before they are given to cattle.

Bean-Fly. — Great injuries are frequently done to beans, especially after a long drought, by a fly called the *Dolphin*; (perhaps the same insect termed the Black-bean puceron.) It is first observed on the top of the plant, and thence eats its way downwards, leaving the stem naked. These insects are so small and light, as to be often carried by the wind from one plant to another, and thus injure the whole crop. They seldom appear till after the beans are in blossom; and, if carefully examined, it will be often found that they are confined to a small space. On their first appearance, it has been observed, that one row of beans has been greatly tainted by them, while another at the distance of six or eight feet continued uninjured. At first, the top leaves and blossoms are attacked by these insects, in consequence of which they appear shrivelled, and full of blackish specks. Whenever this is perceived, the tops should be lopped and removed. If care be taken to leave none that are tainted, the malady will be effectually remedied.

A crop has often been preserved by lopping off the head of the plant, before the insect had descended; for it has seldom been known to rise after falling with the bean-top to the ground. If the plot is small, and lies near the farm-yard, the most effectual remedy is to turn the poultry into it: for they devour, in a very short time, an incalculable number of insects.

BEAN, the Kidney, or *Phaseolus*, L. is a plant of one species, with several varieties. Those principally cultivated for the table, are, 1. The common white, or *Dutch kidney bean*; 2. The smaller kidney, commonly called the *Battersea bean*; and 3. The upright sort, called the *Tree kidney-bean*.

The first of these varieties grows very high, and requires long stakes and poles for its support; its beans are of a considerable size.

The second kind, or Battersea

bean, is more generally cultivated: it never grows very high, and, on account of its moderate growth, the air can easily pass between the rows. It bears abundantly, and is the most savoury kind, except the Tree kidney-bean. This is also a plentiful bearer, never rambles far, and grows up in the form of a shrub; its beans are broader than those of the Battersea kind.

They are all propagated from seeds, which should be sown in dry weather, about the latter end of March, or the beginning of April, to produce an early crop; but they require a dry soil and warm situation. The best method of sowing is, to draw parallel lines over the bed, at two feet and a half distance, into which the seeds are dropped about two inches asunder, and the mould drawn over them to the depth of an inch, with the head of a rake. About a week after sowing, the plants will come up, when the mould should be raised round their stalks as they rise . they will require no farther care, except weeding, and when the beans appear, they should be gathered twice a week; for, if suffered to hang too long, they weaken the plant, and become of little value. The first crop of kidney-beans will continue a month; and to supply the table afterwards, there should be fresh sowings in March, April, May, and June, the last of which will be in season, till destroyed by the frost. Early crops may also be raised in hot-beds, in the same manner as early cucumbers.

BEAR, or *Ursus*, in natural history, a genus of curious quadrupeds, consisting of eight species, the most remarkable of which are:

1. The *arctos*, o. black bear, an animal of a phlegmatic temperament, inhabiting the forests of the North, and also capable of living in a warmer climate, especially the brown bear, which is of the same species, though much larger. The white, or silver bear, is the smallest, and more rarely met with than any other. They differ from all other animals, by their strong ropy hair, a thick head, with a blunt snout, short tail, and waddling gait, though they can run occasionally with great speed. Fond of solitude, bears herd only during the rutting season: after a gestation of six months, the females produce one, two, or three young ones, scarcely eight inches in length, which they suckle six months. They grow till twenty, and live to the age of thirty years. The principal nourishment of the brown bear is animal food, particularly mackarel, ants, and honey. The black bear, on the contrary, subsists entirely on vegetables, and is peculiarly fond of honey, so that it is frequently taken by the Poles and Russians, who expose a bowl of that substance mixed with brandy, by which he becomes so intoxicated, as to fall an easy prey to the captor. Numbers of these animals are annually killed in America, both for their savoury flesh, which resembles pork, and their excellent skin, which forms a very considerable article of commerce.—The flesh of bears' paws are considered as a luxury, even on the Imperial table.

2. The *maritimus*, or polar bear, whose skin is sometimes thirteen feet long: it is confined to the coldest regions of the globe, and has been found by navigators beyond the 80° of north latitude. Fish, seals, and the carcasses of

whales, are the principal food of this animal, which also greedily devours human bodies, and is particularly fond of human blood. Polar bears are bold enough to attack armed men, and even to board small vessels.—Their flesh is white, and similar to mutton in flavour; their fat is melted for train oil, and that of the paws is used in medicine, for anointing rheumatic and paralytic limbs, having formerly been esteemed as a sovereign remedy for these diseases; but the liver is extremely unwholesome and unfit for food. This ferocious creature, however, is easily pacified, when in pursuit of prey; for a glove, or handkerchief, thrown in its way, affords it sufficient diversion, and gives time for the escape of the person pursued.

3. The *luscus*, or wolverene of Hudson's Bay and Canada, a native of the most rigorous climates, and found in the northern parts of Europe and Asia, where it is called the *glutton*; because it feeds so voraciously as to be in danger of bursting, till it has eased itself by squeezing out the contents of its bowels between two trees. Its skin is valuable, as the whole body is covered with very long and thick hair, which varies in colour, according to the season.

4. The *lotor*, or racoon, inhabits the warm and temperate climates of America, the mountains of Jamaica, and is also found in the South Sea islands, &c. In sportiveness, it resembles the monkey, and its skin serves as an excellent substitute for beaver, in the manufacture of hats.

5. The *moles*, or common badger, a clumsy, fetid animal, to be met with in most parts of Europe, and Asia, as far as China, where its flesh is much esteemed, though it is rather a scarce quadruped in all countries. It is generally very fat, and subsists on roots, fruit, grass, insects, and frogs. Having already given a short account of this animal, under the head of Badger, we shall only add that, when overtaken, it defends itself in a vigorous manner, and its bite is dangerous. It burrows under ground, and makes several apartments, to which there is only one entrance, where it may be easily taken during night, in the manner formerly described.

BEARD, the hair growing on the chin and adjacent parts of the face of male adults. The customs of most nations, respecting the beard, have been various. Ancient writers have spoken honourably of the fine beards of antiquity. Homer praises the white beard of Nestor, and of King Priam.—Strabo relates, that the Indian philosophers, the Gymnosophists, were particularly solicitous to make the length of their beards the object of popular veneration.

It would be tedious and uninteresting, to detail the historical accounts respecting the beard. The Chinese consider a long beard as inestimable; and among the Turks it is more infamous for a man to have his beard cut off, than in other countries to be publicly whipt, or exposed in the pillory.—Nature has granted this ornament exclusively to the male sex, with a very few exceptions; hence there appears to be no other justifiable reason for shaving it, than that such custom certainly contributes to cleanliness.—See Shaving.

Bearsfoot, or Setterwort. See Stinking Hellebore.

BEAUTY, in its literal signification, is a term applied to objects of sight, but often figuratively, though improperly, used to express the effect produced by the perception of other senses, such as beautiful music, &c.

PLATO gives but an obscure definition of beauty, when he says, that there are *four* characteristics of the truly beautiful; namely, *universality, supremacy, sameness*, and *immutability*: his supreme beauty, therefore, ought to possess *truth, power*, and *goodness*.

HOGARTH, who was both an artist and a philosopher, lays down the following principles which constitute elegance and beauty: *fitness, variety, uniformity* (as corresponding to a certain end, or purpose), *simplicity, intricacy*, and *quantity*:—the explanation would be too tedious.

According to BURKE, beauty is not the creature of reason, but a merely sensible quality, acting *mechanically* upon the human mind, by sensation. His beauties, consequently, must possess; 1. Comparative *Smallness*; 2. *Smoothness*; 3. *Variety* in the conformation of parts; 4. These parts must not be angular, but melted, as it were, into each other; 5. A delicate frame, with an appearance of agility, rather than strength; 6. Colours clear and bright, but not very strong and glaring; or, 7. If the latter be the predominant colours, they ought to de diversified with others.

Prof. KANT's definition is perhaps more satisfactory, though it can only be clearly understood by apposite comparative illustrations: he says, "Beauty is the *regular* conformation of an object of Nature or Art, in which the mind, *intuitively*, perceives this conformation, without reflecting upon its *ultimate* design or purpose."—The *beautiful* as well as the *sublime*, produces a pleasing effect, but in a very different manner: thus, a view of mountains, with their summits covered with snow, or enveloped in clouds; a description of a violent storm, or MILTON's picture of the infernal regions, affords a satisfaction mingled with terror: on the other hand, a prospect of flowery meadows, valleys intersected with serpentine rivulets, and enlivened by flocks; the description of Elysium by VIRGIL, or of the enchanting Cestus by HOMER, afford both satisfaction and pleasure. But, in order to feel the impression in its full extent, we must first be susceptible of the sublime, before we can enjoy the beautiful.—Lofty oaks, and the solitary shades of the grove, are *sublime*; flowers, young hedges, and trees in a flourishing state, are *beautiful*; the starry heavens and the obscurity of night, are sublime; the brightness or serenity of day, is beautiful.

Personal beauty may be reduced to four heads: *colour, form, expression*, and *grace*. Colours please by opposition, and it is in the face that they are more diversified and exposed. The reason why they please, arises less from their natural liveliness, and their being properly blended, than from the idea they present to the mind, of the perfect health of the object. The beauty of form includes the symmetry of the whole body, even to the turn of the eye-brow, or graceful flow of the hair. Hence, an union and harmony of all parts of the body, is the general cause of beauty; and, while the peculiar beauty of the female form is delicacy and softness, that of the male is apparent strength, or agility.

Expression is the effect of the passions on the muscles of the human countenance, and the different gestures. The finest union of passions, is a just mixture of modesty and sensibility. Indeed, all the benign affections, such as love, hope, joy, and pity, add to beauty, while the predominance of hatred, fear, or envy in the mind, deform the visage.

Grace is the noblest part of beauty. The mouth is the chief seat of grace, as the expressive beauty of the passions is principally in the eyes. There is no grace without motion, nor can impropriety be united with grace. Lord BACON says: "In beauty, that of favour is more than that of colour; and that of gracious and decent motion, more than that of favour."

With regard to the final cause of beauty, our taste for regularity, order, and simplicity, contributes to our happiness; and, as beauty is frequently connected with utility, it is highly conducive to improvements in agriculture, architecture, and manufactures

It also concurs in an eminent degree with mental qualifications, in promoting social intercourse, and forming connections among individuals in society.

Moral Beauty may be defined to consist in that uniform conduct, which, independently of personal interest or advantages, is influenced by no other consideration than that of conscious rectitude. Hence it cannot be applied to a man who acts virtuously, because he is rewarded, and finds no inducement to vice;—nor to persons who are deterred from the commission of crimes, by the apprehension of punishment, whether temporal or eternal.

BEAVER, or *Castor*, a quadruped, of which there are three species.

1. The *fiber*, or common beaver, which inhabits the northern parts of Europe, Asia, and America, in the banks of rivers or lakes, at a distance from the dwellings of men, and is there a gregarious animal. In populous countries, however, such as Germany, Prussia, and Poland, it is a solitary creature; and the skin, on account of its constant residence under ground, is less valuable than that of the *social* beaver. The latter is principally found in North America, where many hundreds settle together on the bank of a river, and construct regular habitations, with admirable ingenuity, such as far excel the primitive huts and hovels erected by mankind. They chiefly subsist on lobsters and other fish, and attain to an age of fifteen or twenty years. The beaver's tail is from six to nine inches long, and one inch thick; its flesh has the flavour of fish, and is esteemed as delicate food. Near the rectum of both sexes, there are two little bags, about the size of a hen's egg, containing a brownish oily matter, called *castor*, which is a peculiar deposition of fat interwoven with cellular membrane. This substance has a disagreeable, narcotic smell, and a bitterish, acrid, nauseous taste. By drying it in the smoke of a chimney, it may be preserved for seven or eight years. It has long been celebrated as a nervine and anti-hysteric medicine, though its efficacy has often been doubted. Yet, we are convinced from experience, that the *genuine* castor affords an excellent remedy,

and may be employed with advantage in languid habits, and such constitutions, in general, as evince neither a rigid fibre nor a disposition to plethora. Even HIPPOCRATES prescribed it in hysteric cases; and GALEN informs us, that ARCHIGENES had written a treatise on the subject. This gelatinous and oily concrete is taken in doses from five to twenty grains, with sugar; or its virtues may be extracted by water, as well as spirit of wine, which latter forms a stronger preparation, but more heating than solid castor itself.

In commerce, a distinction is made between fresh, dry, and fat beaver-skins: the first of these are obtained from animals caught in winter; the second sort from those killed during summer, the hair of which only is used in the manufacture of hats; and the third, or fat sort, are such as have been carried for some time on the naked bodies of the American Indians, who, as it were, tan the skin with perspirable matter. These furs are most valuable, while the hair of the others is manufactured into gloves, stockings, &c. but that which is short and silky, is used for hats. Each beaver, when full grown, is as large as a middle sized dog, and yields about twenty-four ounces of fine hair. The skin serves for covering saddles, trunks, and other articles.

All those advantages, however, are not equivalent to the damage done by the beaver to forests and sluices: and as they yearly become more scarce in America, while the price of their skin and hair advances, it is doubtful whether they ought to be spared, or exterminated.

2. The *moschatus*, or water-rat, of CLUSIUS, is found in Lapland and Russia, on the banks of the Volga and Yaik: it is devoured by pikes and other fish, to which it imparts so strong a flavour of musk, as to render them unfit for the table. Its scent much resembles that of the former species, especially about the tail, from which the cunning Russians express a juice very similar to the genuine musk. Hence, most of the castor sold in the London shops, consists of this inferior sort, or at least is much adulterated with it, so that the druggists themselves are frequently deceived.

3. The *zibethicus*, or musk-rat of North America, the fur of which is much esteemed for its softness and beauty. It is remarkable that, during summer, this animal has a most exquisite smell of musk, which it entirely loses in winter. Probably this agreeable perfume is derived from the *Calamus aromaticus*, or sweet water flag, which is the favourite food of the musk-rat.—See Artificial MUSK.

BED, a convenience for ease, or sleep. It was the general practice in the first ages, for mankind to sleep upon the skins of beasts; and the Ancient Britons, before the first Roman invasion, slept on skins spread on the floors of their apartments. Rushes and heath were afterwards substituted by the Britons, instead of skins; but they reposed upon straw, on the introduction of agriculture by the Romans.

Straw was used as a couch, even in the royal chambers of England, at the close of the thirteenth century; and in the present age, the day-labourers in some parts of England, and the peasantry of Scotland, sleep on chaff-beds.

The most elastic straw is that of *barley*, which may be easily shaken and spread, when inclosed in ticking. Various unsuccessful attempts have been made to substitute the dry leaves of trees, moss, and other soft materials, instead of barley straw, which, however, is more eligible; or the leaves of Turkey corn, or maize, are still better.

A mattress filled with horse-hair is preferable to a feather-bed, which heats and relaxes the body, and disposes it to pulmonary and hectic complaints. The bolster should be stuffed with horse-hair, and covered with a small pillow filled with feathers. The bedding might consist either of sheets, with blankets and a counterpane, or a single cover, thinly quilted with cotton wool: the latter might be easily washed, and will last for several years. In very cold seasons, a counterpane quilted with a few pounds of soft feathers, might be substituted for the former; but it should not be used in summer.

Bed, in masonry, a course of stones or bricks: the joint of the bed, is the mortar or cement placed between each range.

Bed, in gardening, a division of the mould raised above the level of the adjacent ground, for the cultivation of plants or roots.—See Hot-bed.

BED-ROOM, an apartment, or chamber, devoted to the enjoyment of nightly repose, after the usual labour and fatigue of the day. Those happy few who, from their respective situations in life, are enabled to choose a spacious and lofty room for breathing in, at least, one-third of their existence, may consider themselves peculiarly fortunate. It must, however, be confessed, that little attention is generally paid to this important object, even by such persons as might, in this respect, equally consult their health and convenience.

A bed-chamber ought never to be on a ground-floor, or have a northern aspect. Although, on account of a cooler air, many prefer this situation in summer, yet it cannot fail to be unwholesome, as it is most exposed to the influence of a damp atmosphere in the morning, and during the night. Hence we are of opinion, that an *eastern* front is more conducive to health; because it receives the first rays of the sun, that beneficent luminary, who, more regularly than a time-piece, awakens the man of a sound body and mind, while he animates, invigorates, and incites him to rise, after having refreshed himself by repose. Besides, a moderate degree of heat, thus naturally imparted, may be more easily endured, and modified, if necessary, by various means, than a moist and pernicious atmosphere, which even the dry air of summer cannot easily correct.

For similar reasons, small closets and concealed beds are extremely injurious, especially to young people and invalids. When persons are from necessity obliged to sleep in them, it will be advisable every morning, immediately after rising, to displace all the bed-clothes; and, if the sky be serene, to open the door and windows, in order to purify the stagnant air of so confined a resting place: but we think it, on the whole, a dangerous practice to sleep with open windows, whether at night, or in the day-time; though a very small aperture, without admitting a current of air to pass through the room, may occasionally be useful. Nor should the bedstead be placed near a wall; or soiled linen be suffered to remain in an apartment where the purity of the air is of the first importance. A bed, or couch, ought to stand free on all its sides, and, if possible, in the middle of the chamber: which is farther of consequence to timid individuals, who tremble during the prevalence of a tempest, or thunder-storm. We know from experience, that a flash of lightning, should it unfortunately strike a building, or enter through any of the windows, uniformly takes its direction along the walls, without injuring the furniture in the centre of a room.

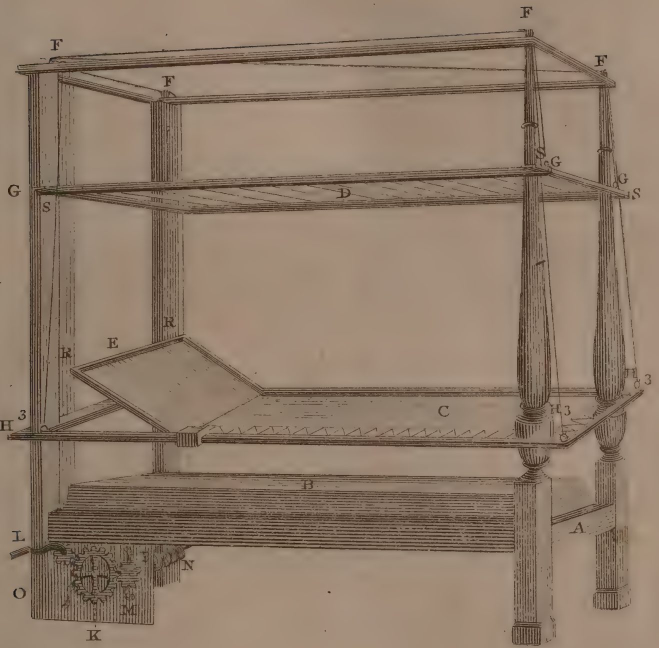
BEDSTEAD, a frame for supporting a bed. Among the various materials used for bedsteads, iron is not only the most durable, but also the most beneficial, with respect to health. Oak is excellent for this purpose, being almost impervious to worms, if felled in the proper season, and allowed to become dry; but cedar, were it not for its strong odour, would be still more efficacious in preventing the inroads of bugs, or other vermin. Hence, the beams and posts of a bedstead, made of any hard wood, might be inlaid with cedar.

On this occasion, we cannot, in justice to Mr. LAMBERT, of Berwick-street, Soho, omit to give a concise description of his newly-invented BEDSTEAD FOR THE SICK and WOUNDED, which he terms the *Royal Patent Fracture Bed*, and which is ably caculated to alleviate the painful situation of the aged, the infirm, or diseased. This ingenious contrivance, therefore, affords a comfortable accommodation to persons confined by fractures, gout, palsy, &c. it is particularly adapted to lying-in women. The bed may be made, and the linen changed, without in the slightest manner disturbing the patient, which renders it highly serviceable in camps and hospitals.

We have given a plate of this useful invention, of which the following is an explanation: *A*, the bedstead; *B*, the feather-bed; *C*, the straining-frame; *D*, the fracture-frame; *S,S,S,S*, four rings in the fracture-frame; *E*, the sleeping-desk; *R,R*, two rings in the sleeping-desk; *F,F,F,F*, pullies put in motion by the machinery; *G,G,G,G*, receiving-hooks of the fracture-frame; 3 3 3 3, four rings in the straining-frame; *H,H, H,H*, receiving-hooks to ditto; *I*, the plate of the machinery; *K*, the great wheel; *L*, a pinion, with a wynch turning the great wheel; *O*, a pall or stop; *M*, a pinion with a fly, to prevent a too sudden descent; *N*, the rollers.

The subjoined directions should be attended to in making and using the bed. Lay the straining-frame *C*, covered with ticking, on the feather-bed *B*, then the under-blanket and sheet: above these, place the fracture-frame *D*, (on which the patient is supported); then the bolster, pillows and upper-clothes, in the usual manner. When the feather-bed is to be made, wind up the two frames, *C*, and *D*, by the wynch, till the patient is supported above the bed, which may then be made, or, if necessary, another placed in its stead, and the two frames let down upon it.

In changing the linen, the two frames *C*, and *D*, must be wound up till they reach the four hooks *G,G,G,G*; secure the hooks in the four rings *S,S,S,S*, and wrap the sheet you intend to remove, round the



BEDSTEAD for the SICK & WOUNDED.

Invented by Mr. Lambert.

the upper clothes, to exclude cold; let down the under-frame *C*; replace the blanket, and put on the clean sheet; draw away the other, and again wind up the frame to the fracture-frame, and unhook it at the four corners. Thus resting on the under frame, the patient safely descends to the comforts of a new-made bed and clean linen.

As in the early stages of consumptive, or asthmatic disorders, it is material to avoid the heat of a feather-bed, particularly if the patient be liable to night-sweats, and if he be able to rise and have the linen changed, the fracture-frame may not be necessary: in this case, the lower frame may be wound a little above the feather-bed; at the top of the frame *C*, there is a sleeping-desk, *E*, by which the head and shoulders may be raised at pleasure, by fixing the two hooks at the end of the frame to the two rings *R,R*, and freeing those at the feet: after which, by the use of the wynch, it may be lowered or raised at pleasure.

The whole apparatus may be attached to any four-post bedstead by a common carpenter.

It is needless to expatiate upon the utility of such a bedstead, to families at a distance from the metropolis: and as we have no personal acquaintance with this ingenious artisan, we cannot be suspected of partiality: indeed, the first account of his invention, together with a plate, was communicated to us by means of a foreign journal, lately imported.

Lastly, it deserves to be noticed, that the prevailing custom of providing the bedsteads of children with *curtains*, is liable to strong and serious objections: 1. Because they prevent a free access of air for the renewal of that mass which has been rendered unfit for respiration; 2. They endanger the lives of infants by candle-light, from which fatal accidents have frequently happened; and 3. They are pernicious receptacles for the finest particles of dust, which, as we have already observed (See Bed), are inhaled by the person confined within such curtains, on the least motion of the bedstead: and thence, perhaps, many young and blooming innocents may date the first period of their consumptive attack. We do not, however, mean to insinuate, that curtains ought to be universally abandoned, as there may occur a variety of instances, in which the laws of propriety and *decorum*, might render them useful and necessary.

BED-TIME, or that period of the evening or night, when we retire to enjoy the necessary repose.

Although it would be difficult, in the present irregular state of society, to lay down rules for the proper time of resorting to that place which suspends and makes us forget our daily troubles and cares; yet, when we consider the subject, with regard to its influence, as well on the health as the moral character of man, it is deserving of the most serious discussion. Much, indeed, depends on the arrangement of the day, and the different pursuits of the individual. Those persons who spend the greater part of their time in useful labour, and have sufficient muscular exercise, would better consult their health, by retiring to repose at least two or three hours *before midnight*; which, according to the oldest and most accurate observers, are nearly as refreshing as double that portion in the morning. Those, however, who lead an idle and luxurious life, are too much the slaves of fashion, habit, and caprice, to adopt any useful changes, which might abridge their amusements or imaginary comforts.

On the other hand, the studious, and especially speculative persons, cannot comply with what are generally called "regular hours;" because their pursuits are better adapted to the solemn stillness of night, while they indulge in reflections which require a connected series of thought, and reasoning, uninterrupted by the noise of day. Yet, even *literati* and *artists*, ought to pay due attention to this important circumstance, that the atmosphere of the night is always more vitiated, and consequently less fit for respiration, than that of a serene day; and as we respire a greater portion of air while awake, than in a sleeping state, it follows that the system must be more injured in the former than in the latter case.

Nor would it be proper to retire to rest immediately after a full meal, or in an agitated state of mind. Hence, two hours after a light supper ought to elapse, in order to prepare ourselves for an invigorating repose, and banish all gloomy or depressing ideas and thoughts which require mental exertion. For the same reason, we should remove from our sight every object which may irritate the nerves, and never adopt that pernicious practice of reading, till we fall asleep—an imprudence of which many young and thoughtless persons are guilty. Instead of such a dangerous expedient, it would be more salutary to walk up and down the room for a few minutes, or to take any other gentle exercise.

Lastly, we are of opinion, that such individuals as breakfast at nine, dine at two, and drink tea at six; or, instead of this, eat a light supper between seven and eight o'clock, might with the greatest benefit to their health, retire to bed at ten, and rise at five or six o'clock in the morning, or earlier, according to the degree of exercise they have taken on the preceding day.—See farther — SLEEP; SLEEPING, and WAKING.

BEE, or *Apis*, in natural history, a genus of insects, of which the *mellifica*, or domestic honey-bee, is particularly worthy of attention.

I. *Economy*, *Instincts*, &c.

A hive of bees may be considered as a populous city, containing from fifteen to eighteen thousand inhabitants. This city is in itself a monarchy: composed of a *queen*; of males, which are the *drones*; and of working bees, called neuters. The combs are composed of pure wax, serving as a magazine for their stores, and a place to nourish their young. Between the combs there is a space sufficient for two bees to march abreast; and there are also transverse defiles, by which the bees can more easily pass from one comb to another.

The queen-bee is distinguishable from the rest, by the form of her body. She is unwieldy, and seldom leaves the parent-hive; but when she goes to settle a colony, all the bees attend her to the place she choses. A hive of bees cannot subsist without a queen, as she produces their numerous progeny; hence their attachment to her is unalterable. When a queen dies, the bees immediately cease working, consume their honey, fly about at unusual hours, and eventually pine away, if not supplied with another sovereign. The death of the queen is proclaimed by a clear and interrupted humming, which should be a warning to the owner to provide the bees with another queen, whose presence will restore vigour and exertion: of such importance is a sovereign to the existence and prosperity of this community.

It is computed that the ovaria of the queen-bee contain upwards of *five thousand* eggs at one time, hence it is probable that she may produce from ten to twelve thousand bees in the space of two months.

The dissection of the *drone* affords as great a proof of its being the male, as that of the queen does of her being a female. Drones are smaller than the queen, and larger than the working-bees; and when on the wing, they make a greater noise. Their office is to impregnate the eggs of the queen after they are deposited in the cells; but when this is effected, as they become useless to the hive, they are destroyed by the working-bees, without the power of resistance, as they have no sting. After the season of the increase of the bees is past, and when they attend to the collection of winter-stores, every vestige of the drones is destroyed, to make room for honey. Indeed, when the latter are observed in a hive late in atumn, it is a bad sign.

Several kinds of *working-bees* were distinguished by the ancients. Columella coincides with Virgil, in preferring those which are small, oblong, smooth, bright or shining, and of a gentle disposition: the superior utility of this species has been established by experience. Working-bees compose the most numerous body of the state. They have the care of the hive; collect the wax and honey; fabricate the wax into combs; feed the young; keep the hive clean; expel all strangers; and employ themselves in promoting general prosperity. The working-bee has two stomachs; one to contain the honey, and another for the crude wax.

II. *Of the management of Bees*, and the most approved methods of preserving them, on removing their honey and wax.

According to Columella, an *Apiary* should face the south, in a situation neither too hot nor too cold. It should stand in a valley, that the bees may with greater ease descend, on their return to the hive; and near the mansion-house, but situated at a distance from noise and offensive smells; surrounded with a wall three feet high, and in the vicinity of a brook or river. Where the bees cannot have the benefit of running water, they ought to be supplied with it in troughs provided with small stones, on which they may stand while they drink. They cannot produce either combs, honey, or food for their maggots, without water; but the neighbourhood of rivers or canals with high banks, ought to be avoided, lest the bees should be precipitated into the water by high winds, and consequently perish. The garden in which the apiary stands, should be supplied with melliferous plants, and branchy shrubs, that the swarms which settle on them may be the more easily hived.

Particular attention should be paid to the circumstance, that the bees be hived in a neighbourhood productive of such plants as supply them with food; such as thyme, the oak, the pine, fruit-trees, furze, broom, mustard, clover, heath, &c. PLINY recommends broom, as a plant particularly grateful and profitable to bees.

BEE-HIVES made of straw, have been generally preferred, as they are not liable to be over-heated by the rays of the sun, keep out the cold better than wood, and are cheaper than those of any other material.

M. CHABOUILLE, in France, has lately suggested improvements upon bee-hives, which appear to us deserving of notice. His principal object is to procure the greatest degree of cleanliness for these delicate and industrious insects, by covering the bottom of the hive with plaster of Paris, and constructing the cylindrical inclosure of rye-straw, and cross ligaments, or bands, made of the inner rind of the lime-tree. When the basket-work is completed, he coats it over with a cement made of two-thirds of cow-dung, and one-third of ashes. In the interior part of the hive, he places two thin pieces of oak, crossing each other at right angles, which greatly facilitate the deposition of the honey-combs. The cover of the hive consists of a firm board, seventeen inches in diameter, and the entrance is so constructed, that it may be closed by a small door, to exclude injurious animals during winter. The lower part of this door has small semi-lunar incisions, each of which admits two bees abreast: above these, are made two rows of holes, just large enough for one bee to pass. The floor should be so constructed, that it may encompass and secure the foundation of the hive, to prevent any disturbance from that quarter. Such a smooth and white floor of gypsum, greatly contributes to cleanliness, and the bees become so much attached to it, that they will not easily relinquish their habitation. The straw-wall ought to be one-inch, and the cement before described, half an inch in thickness: the latter is the best coating yet contrived, for excluding noxious insects which would perforate the straw, and for sheltering the bees from rain and wind, while it exhales an odour very grateful to them. M. CHABOUILLE has also observed, that bees kept in a hive of this description, are sufficiently protected against the effect of cold during winter; and that they swarm much earlier than those reared in any other.

However ingenious this contrivance may appear, we regret that the inventor has not stated the particular dimensions of the bee-hive, nor attended to many other circumstances relative to the culture of the insect itself. Hence we are induced to communicate a later, more accurate, and circumstantial description of a bee-hive, invented in Italy by Professor GAETANO HARASTI, which has proved of practical utility. This account is translated from the *Transactions of the Patriotic Society of Milan,* and as it contains much useful information on the subject, we have endeavoured to render it of practical service, by accompanying it with the appropriate cuts of the different figures described.

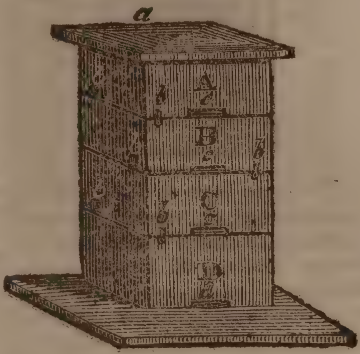
It is well known that bees, when properly cultivated, produce considerable profit, and in order to obtain the greatest possible advantage, it is necessary to supply them with every convenience for the support of themselves and their young. We should also contrive means to take the wax and honey with the smallest possible loss. In short, when the apiary is placed in a good situation (either south or south-east), that is, in a country abounding with flowers, at a distance from brew-houses, smelting works, &c. the next and most important point, is the choice of well-constructed hives.

In Lombardy, the common hive, composed of straw, or twigs, is generally used, though ill-contrived; as it is difficult to take away the wax and honey without destroying the bees.

Reflecting on these circumstances, M. HARASTI, during his cultivation of bees, conceived that it would be possible to form a hive which should have all the advantages of the best kind, while the simplicity and cheapness of its construction, might bring it into general use among husbandmen.

A good bee-hive ought to possess the following properties: First, it should be capable of enlargement or contraction, according to the number of the swarm. Secondly, it should admit of being opened without disturbing the bees, either for the purpose of cleaning it; of freeing it from insects; of increasing or dividing the swarm; or for the admission of a stock of provisions for the winter. Thirdly, it should be so constructed, that the produce may be removed without injury to the bees. Fourthly, it should be internally clean, smooth, and free from flaws. All these properties unite in the hive here described.

It is formed of four open square boxes, A, B, C, D, as represented by the following cut:

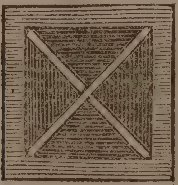


These boxes are fastened to each other by several wooden buttons, *b*, *b*, &c. which turn upon a nail or screw. The whole is covered with a moveable roof, which projects over the boxes slanting from the centre *a*, that the rain-water may run off. It is necessary to place a stone on the top of the roof, to keep it on firm.

Instead of buttons, the boxes may be combined by a rabbet fastened with wooden pegs; but in either case, the conjoined parts should be closed with cement. If the swarm is not very numerous, three, or even two, boxes will be sufficient. Each of them should be about three inches, or three inches and a half in height, and about six inches in the clear within. They should be made of wood, at least three quarters of an inch thick, that the bees, wax, &c. may be less affected by changes in the temperature of the atmosphere.

Within the boxes, at the upper part,

part; there should be fixed two bars, in the form of a cross, with the extremities extending to the angles of the box, as is represented in the following figure :

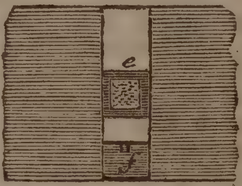


To these bars the bees attach their combs. At the lower part of each box, in front, there must be an aperture or door, as at *c, c, c, d*, as high as is necessary for the bees to pass conveniently, and about an inch and a half wide; of these apertures, only the lowest (marked *d*), is to be left open for the passage of the bees; the others are to be closed by means of a piece of wood, properly fitted to them.

It must be evident, that this bee-hive has all the advantages before mentioned. To lessen or enlarge it, only requires a diminution or increase of the number of the boxes; and a communication with the internal part can easily be effected by the removal of the cover.

The cheapness and facility of the construction of this hive is evident, as nothing is requisite but to join four boards with nails, or in any other manner, so simple that it may be done by a day-labourer.

When the hives are made, they should be placed in a good situation : the best it south-east. The rays of the morning sun will rouse the bees to their labour ; but they must not be too much exposed to the heat of noon, which may be mitigated, by placing the branches of trees to shade the hives, as violent heat is injurious, not only to the bees, but to the wax and honey. The country around the apiary should be of a sandy soil, abounding with plants and shrubs. As bees love cleanliness and quiet, the circumjacent space should be kept clean, and free from offensive smells and noise ; smoke is particularly disagreeable to them. The boards or table on which the hives are placed, should be dry, clean, and sound ; and the hives ought to be sufficiently raised to prevent their exposure to dampness and insects ; they should also be kept at a distance from a wall, to avoid the reflected heat of the sun. In the table on which the hives are to stand, there should be an aperture, under each, about two inches square, as is represented at *e*, in the following cut :



This aperture should be covered with a piece of tin, drilled full of small holes, so as to afford a free passage to the air, and at the same time prevent the ingress of insects. That this may not occasion any inconvenience to the bees in cold and damp weather, there must be a sliding piece of wood, *f*, under the tin, by which the hole may be completely covered.

When it is intended to introduce a swarm of bees into a new hive, it must be thoroughly cleaned, and the inside rubbed with virgin wax. It is advantageous to place a piece of clean honey-comb, about nine inches long, in the hive, and care should also be taken to choose that which is made of very white wax. This piece being supported by a stick passed through it, offers to the bees a kind of nest, and excites them to continue their work.

The new hive being thus prepared, the manner of introducing the bees into it, from an old hive, is as follows: the latter must be placed upon one of the boxes of the new one; but as it will seldom happen that they are of the same size, and exactly fit each other, a board, at least as wide as the largest of the two hives, and which has a hole equal in size to the smallest, must be placed between them, and completely joined with cement, or by any other means, in such a manner as to be quite close, and to leave the bees no passage except into the new hive. As these insects generally work downwards, they will soon get into the new hive; and, when it is occupied by about one-half of the swarm, some holes must be made in the top of the old hive, and kept covered, till the proper time for making use of them.

Every thing being disposed as above directed, we must take the opportunity of a fine morning (but not a very hot one), about eight or nine o'clock, at which time most of the bees are generally out of the hive, gathering their harvest. The comb is to be cut through, by means of a piece of iron wire, and the old hive, with the board on which it stands, is to be separated from the new one. An assistant must immediately place the cover (already well fitted) upon the top of the new hive. The old hive is then to be taken away, to the distance of thirty or forty paces, and to be there placed upon two chairs, or other supports, in such a manner as to be quite firm; but leaving a free space, both above and below, for the following purpose.

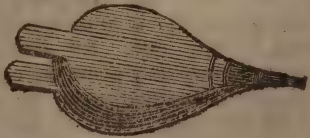
Upon this old hive (the holes at the top of it being first opened) is to be placed one of the boxes of the new hive, having the cover loosely fastened on it, so that it can easily be removed; this box must be fixed upon the old hive, in such a manner (by closing the intervals between them with linen cloths, &c.) that the bees, upon going out by the holes in the top of the old hive, can only go into the new one. In order to drive them into it, some live coals must be placed under the old hive, upon which a few linen rags may be thrown, to produce a great volume of smoke. As the smoke rises, the bees, being incommoded by it, will ascend to the top of the old hive, and at length will go through the holes into the new one. When all the bees, or nearly all, are gone into it (which may be known by looking in at the little door, or by their noise), it is to be removed gently from the old hive, and placed under the box already alluded to, the top or cover being previously taken off. The next morning, if it should appear that the two boxes, of which the new hive is now composed, do not afford sufficient space for the bees, a third box may be added, under the others; and after that a fourth, if necessary, as their work goes on, changing them from time to time, so long as the season permits the bees to gather wax and honey.

In performing the operations here described, it will be necessary to defend the hands and face from the stings of the bees. The best way of doing this, is to cover the whole of the head, neck, &c. (over a hat) with coarse cloth, or canvass, which may be brought as low as the waistcoat, and fastened to it: through this cloth we may see the operations of the bees, without fearing their stings. The hands may be protected by means of gloves, of which the best are those made of wool.

When we mean to bring a new swarm into a hive, that prepared as above, and formed of two, three, or four boxes, according to the size of the swarm, must be brought near the place where the swarm is. The upper box, with the cover fastened on (but so that it may easily be removed), must be taken from the others. The cross bars, before described, should be smeared with honey, diluted with a little water; the small door must be shut; and the box must be turned upside down, and brought under the swarm, which is then to be introduced, in the same way, and with similar precaution as into a common hive. When the whole swarm is in the box, it is to be carried to the other boxes (previously placed in their destined situation), and, turning it very carefully, is to be put upon them. The buttons are then to be turned, the interstices closed with the cement already described, and all the little doors closed, except the lowest, through which the bees are to pass. Nothing is more disagreeable to a fresh swarm than a hot sun, for which reason, that the bees may not wish to leave their new habitation, it will be right to shade the hive for some days.

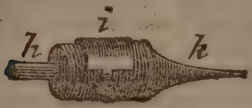
But it is more advantageous to form artificial swarms, than to collect those which abandon their native hives, and the hive here described is very convenient for that purpose. The following method, M. Harasti conceives to be more simple, and more secure than any other hitherto proposed.

Take a well-stocked hive, of four boxes, in some of these, particularly in the two lowermost, if they are well filled, there is certainly a young brood; for in these lower boxes the young bees are accustomed to change from the chrysalis to the perfect state, about the end of April, or beginning of May, if the hive be very full; but, if otherwise, this change does not take place till towards the end of May, or even the middle of June. At that time, a fine serene day, but not excessively hot, must be chosen, and about eight or nine o'clock, the hive must be divided into two, in the following manner: Between the two upper boxes and the two lower ones, force in a few slips of wood, so as to separate the boxes sufficiently for the comb to be cut through with a piece of iron or brass wire. To prevent the bees from coming out through this opening, and thereby annoying the person employed in the operation, the smoke of tobacco may be blown (by introducing the small end of a pipe) into the opening; this will cause the bees to resort to the inner part of the hive, and will keep them quiet. Or, instead of the pipe, a small pair of bellows



may be used, to the nozle of which

is fitted a hollow cylinder of tin, or other metal, furnished



with a little door *i*, and terminating at one end in a tube *h*, (into which the nozle of the bellows is fitted) and at the other end, in a smaller tube, *k*, through which the smoke is to pass. Into the body of the box, through the door *i*, is to be put a lighted rag, the smoke of which may be blown, by means of the bellows, into the hive. But, if the hands and face are well covered, these precautions are unnecessary. An empty box must be in readiness, in the place where the hive is to stand; a cover must also be procured; and, as soon as the hive is divided in two parts, the two upper boxes must be taken from the lower ones, and the cover must be immediately put upon the latter, closing all the interstices with the usual cement. The upper boxes are to be placed upon the empty one just mentioned, so that a hive will there be formed of three boxes. The lower boxes, on which the fresh cover was put, must be left at rest till the evening, at which time a third may be placed under them; and when it appears that a proper quantity of work has been done in the lower box (of either hive), a fourth box may be added, under the others.

In the above manner, artificial swarms may be formed; and, by this method, we not only avoid the inconveniencies which attend the procuring of swarms in the common way, but we obtain the advantage of having the hives always well stocked. This ought to be the first object of every one who cultivates bees; for it is allowed to be of more advantage to keep the hives well stocked, than to increase their number; and, in fact, it has been observed, that if a hive of 4000 bees gives six pounds of honey, one of 8000 will give twenty-four pounds.

Upon this principle, it is proper to unite two or more hives, when they happen to be thinly stocked. This may easily be done, by taking a few handfuls of balm, and scattering it in those hives which are intended to be united. By this means, the bees will all acquire the same smell; and, it has been observed, that, by the sense of smelling, bees distinguish those which belong to the same hive. After the above preparations, the hives are to be joined, by placing them one upon the other, in the evening, when they are at rest, taking away those boxes which contain few or no bees. Care must be taken to shut all the little doors, except the lowest.

It may even be proper sometimes to shut the lower door also, when, for instance, any tumult within the hive, causes the bees to endeavour to quit it; which may happen from there being more queens than one, or from the invasion of wasps, hornets, &c. In such case, that the bees may not be deprived of air, a piece of tin, perforated with numerous holes, may be used to close the opening, instead of the usual door, and may be taken away when the bees become quiet.

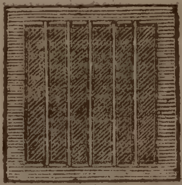
The following is the method of taking the wax and honey, with little or no injury to the bees; but it should be previously remarked, that the honey is chiefly at the top of the hive, the young brood in the middle, and the greatest stock of wax is at the bottom. For this reason, when three of the four boxes are filled with comb, &c. the upper one A is to be first taken off, in the manner here described. The buttons *b*, *b*, &c. which serve to unite the boxes, are to be turned, or the wooden pegs (if such are used) taken out; the cement employed for closing the intervals is to be scraped off; and then a piece of iron wire is to be drawn through the comb, so as to divide it. When the box A, is separated, its cover is to be taken off and put upon the box B, now become the highest. After taking out the contents of the box A, it is to be cleaned, and again placed upon the stand or table, under the box D, taking care to open its little door, and to shut that of the box D. To prevent any bees remaining in the upper box, when taken away, a little smoke may be introduced by means of the bellows already described.

The more empty space the bees find in the hive, the more eagerly they go to work. The brood of the box B, which remained at top, do not long delay to swarm, or at least they pass from the state of chrysalis into that of the perfect and laborious animal; therefore, when it is perceived that the lower part of the hive is occupied, the box B, may be taken off, in the manner already described, and, after being emptied, may be placed under A.

In the same way, the third box C, in which there is generally a good stock of wax, may afterwards be taken off; but this is a matter of greater consequence, because in general the eggs are deposited in it. We must also take care not to deprive the bees entirely of the stock of wax and honey which they have collected for the winter.

A hive made in the manner here pointed out, appears to me to be such as would be most useful to husbandmen in general, who wish to cultivate bees; but a hive may be made, upon the same principles, which will shew the work of the bees, through its whole progress, and thereby enable any one to study the natural history of these wonderful insects.

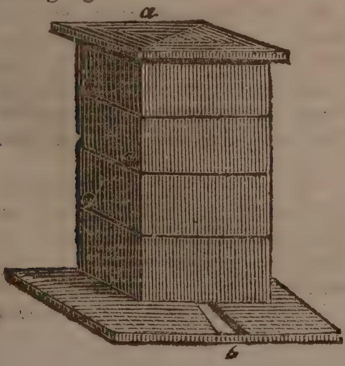
A hive of this kind is composed of three or four boxes, with a cover, like the hive already described; it may also be of the same form and size. But, in every box, on that side which is opposite the little door, there must be fixed a pane of glass, with a sliding shutter over it, so that by drawing back these sliders, the inside of the hive will be exposed to view. To see the bees at work, however, it is necessary that the comb should be disposed in a regular manner, and perpendicular to the pane of glass. This may be obtained, by placing in the boxes, instead of the two cross-sticks already described, in p. 218, five parallel sticks or bars, as represented in the following figure:



The bees will attach their combs to these bars, and the intermediate space will afford sufficient light for seeing them work. If more light is desired, it may be obtained by opening the little doors opposite the glass; which doors may be made considerably higher than is above directed, and may have a slider over them, by which their aperture may be diminished at pleasure.

The sliders which cover the panes of glass, ought never to be opened, except for the purpose of observing the bees; because a strong light lessens their disposition to work. If it should be perceived that the coldness of the glass is prejudicial to the bees in winter, it may then be covered with a cotton cloth; or it may be entirely taken away, and a piece of paste-board put in its place; for at that time, the operations of the bees are suspended.

Instead of making a little door to each box, to be left open when the box is lowermost, for the passage of the bees, perhaps it might be better (because more simple) to cut a groove in the board or table on which the hive is placed. This groove should be about two inches wide, and about three-fourths of an inch high at the outer edge, and should be gradually diminished, both in width and height, towards the part where it meets the hive, as is represented at *b*, in the following figure:



Two advantages are derived from this construction. First, the little door in the box, and the contrivance for opening and shutting it, will be unnecessary. Secondly, it is sometimes proper to diminish or enlarge the opening for the passage of the bees, according to circumstances, without shutting it entirely, and this may be done with the greatest ease, by moving the hive nearer to, or farther from, the edge of the table; or this passage may be entirely closed, by moving the front of the hive beyond the groove; but, in that case, some small holes must be made in the hive to let in air, which may be stopped up when that formed by the groove is open.

A farther advantage attending this construction is, that as the groove will have a slanting direction, the bees will thereby be enabled, with very little trouble, to remove from the hive any dead bees, excrement, &c. which may be obnoxious to their nature.

Another very curious and useful bee-hive, is that originally contrived by Mr. THORLEY, of London; which, from near sixty years experience, has proved of superior utility to any other—it is constructed as follows: the lower part is an octangular box, made of deal boards, about an inch in thickness, the cover of which is externally seventeen inches in diameter, but internally only 15½, and its height ten inches. In the middle of this cover is a hole, which may be opened or shut at pleasure, by means of a slider. In one of the pannels is a pane of glass covered with a wooden door. The bee-hole at the bottom of the box is about 3½ inches broad, and half an inch high. Two slips of deal, about half an inch square, cross each other in the centre of the box, and are fastened to the pannels by means of small screws. To these slips the bees fasten their combs. In this octangular box the bees, after swarming in the usual manner, are hived, and suffered to continue there, till they have built their combs, and filled them with honey; which may be known by opening the door, and viewing their works through the glass pane, or by the weight of the hive. When they have filled their habitation, a common bee-hive of straw, made either flat at the top, or in the common form, must be placed on the octangular box, and the slider drawn out; thus a communication will be opened between the box and the straw-hive, so that these industrious insects will fill this hive also with the product of their labours. When the straw-hive is sufficiently filled, the slider may be pushed in, and after placing another in its room, again speedily removed.

Mr. Thorley has added another part to his bee-hive, which consists of a glass receiver 18 inches in height, 8 inches in diameter at the bottom, and in the greatest part 13. This receiver has a hole at the top, about an inch in diameter, through which a square piece of deal is extended to nearly the bottom of the vessel, having two cross bars, to which the bees fasten their combs. Into the other end of this square piece is screwed a piece of brass, which serves for a handle to the receiver, or glass hive. When the bees have filled their straw hive (which must have a hole in the centre, covered with a piece of tin) Mr. T. places the glass receiver upon the top of the straw hive, and draws out the piece of tin. The bees now, finding their habitation enlarged, pursue their labours with such alacrity, that they likewise fill this glass hive with their stores.

The Egyptian bee-hives are made of coal-dust and clay, which being well blended together, the mixture is formed into a hollow cylinder, about a span in diameter, and from six to twelve feet high: this is dried in the sun, and becomes so hard that it may be handled at pleasure.

Another, of a very simple and ingenious construction, has been invented by M. De Gelieu. It may be made either of straw or wood; but, as its internal dimensions must be the same throughout its whole length, it is necessary that its form should be either cylindrical or prismatic. Its principal advantage is, that its bases are moveable, and may be fixed by pins at any distance from each other; by which means its size may be increased, or diminished, according to circumstances. It must lie on its side, and, in the foremost base, there must be a passage left for the bees. Hence, by drawing out the posterior base, the honey may be taken from the back part of the hive, without hurting the bees; and, when this is done, the base should be pushed in close to the remaining comb, that an intermediate space may remain. By turning the hive, and making the entrance in that part, which had before been the posterior base, the bees will build new cells, in the room of those taken away; consequently the honey will be whiter, and more pure.

Whoever intends to erect an apiary, should purchase hives towards the close of the year, when they are cheapest; and such only as are full of combs, and stocked with a sufficient number of bees. In order to ascertain the age of the hives, it should be remarked, that the combs of the last year are white, while those of the former year acquire a darkish yellow. Where the combs are black, the hive should be rejected as too old, and liable to the inroads of vermin.

Bees never swarm till the hive is too much crowded by the young brood. They sometimes begin to swarm in May, or earlier, according to the warmth of the season. As soon as a swarm is settled, the bees should be immediately hived, to prevent their taking wing again. If they settle on a low branch of a tree, it may be cut off and laid on a cloth, the hive being ready for their reception. If the queen can be placed in the hive, the rest of the bees will soon follow; but if it be difficult to reach them, it will be advisable to let them remain where they have settled till the evening, when there will be less danger of their escaping.

When the swarm is hived, they should be immediately removed to the apiary, but the hive should be kept near the place at which the bees settled, till the evening, lest some stragglers might be lost.

The usual method of uniting swarms, is by spreading a cloth at night upon the ground close to the hive in which the two swarms are to be placed. Lay a stick across the cloth, on which place the hive with the new swarm: on giving a smart stroke on the top of the hive, all the bees will drop in a cluster upon the cloth. Then take another hive from the stool, and place it over the bees, when they will ascend into it, and mix with those already there. Another method is, to invert the hive in which the united swarms are to live, and strike the bees of the other hive into it, in the manner before described.

All the writers on this subject acknowledge, that one of the queens is slain on this occasion, together with a considerable number of the working bees; but COLUMELLA only, has suggested an easy mode of killing the queen of the latter swarm before the union, and consequently of preserving the lives of the working bees. This may be effected, by finding her when the bees are beaten down upon the cloth.

A large swarm weighs eight pounds, and others gradually less, to one pound. Hence a good swarm should weigh five or six pounds. Such as are less than four pounds weight, should be strengthened by a small additional swarm. The size of the hive ought to be proportionate to the number of the bees, and it should be rather too small than too large, as these insects require to be kept warmer than a large hive will admit.

Great improvements may be made in providing plenty of pasture for bees; and as a rich corn country is unfavourable to their industry, the practice of other nations, in shifting the abode of their bees, is deserving of imitation.

M. MAILLET, in his description of Egypt, informs us, that the natives of that fertile country annually send their bees into distant regions to procure sustenance for them, when they cannot find any at home. About the end of October, the inhabitants of Lower Egypt embark their bees on the Nile, and convey them to Upper Egypt, when the inundation is withdrawn, the lands are sown, and the flowers are beginning to bud. These insects are thus conducted through the whole extent of Egypt, and, after having gathered all the rich produce of the banks of the Nile, are re-conducted home about the beginning of February.

In France, floating bee-hives are very common. One barge contains from sixty to a hundred hives, which are well defended from the inclemency of the weather. Thus the owners float them gently down the stream, while they gather their honey from the flowers along its banks; a single bee-house yields the proprietor a considerable income.

Their method of transporting bees by land, is also worthy of our attention. The hives are fastened to each other by laths, placed on thin pack-cloth, which is drawn up on each side, and then tied by a piece of pack-thread several times round their tops. In this state they are laid in a cart, which generally contains from thirty to fifty hives, and conveyed to places where the bees can collect honey and wax.

During the winter, bees are in so lethargic a state, that a little food is sufficient for their sustenance: but as every sunny day revives, and prompts them to exercise, food is necessary on these occasions. Some hives of bees which are supposed to have died of cold, have in reality perished by famine, especially when a rainy summer prevented them from collecting a sufficient store of provision. Hence the hives should be carefully examined in autumn, and ought then to weigh at least eighteen pounds each.

With respect to the feeding of bees, the common practice is, to leave them as much honey in autumn as will make the hive weigh twenty pounds. The honey should be diluted with water, and put into an empty comb, split reeds, or upon clean wool, which the bees will suck perfectly dry. By the dilution with water, however, the honey is apt to become candied, in which state it is prejudicial to the bees. A better method is, to replenish the weak hives in September, with such a portion of combs filled with honey taken from other hives, as may be deemed a sufficient supply. This is done by turning up the weak hive, cutting out the empty combs, and placing full ones in their stead, secured by pieces of wood, that they may not fall down when the hive is replaced. If this method be considered too troublesome, a plate of honey, unmixed with water, may be placed under the hive, and straws laid across the plate, covered with paper perforated with several small holes, through which the bees will suck the honey without difficulty.

The degree of cold which bees can endure, has not been ascertained. In the cold parts of Russia, they are often found in hollow trees. Their hives are frequently made of bark, which does not afford them much protection. Hence Mr. WHITE observes, that bees which stand on the north side of a building, will not consume more than one-half of the honey necessary to supply others which stand in the sun. In winter, however, they should be examined; and if, instead of being clustered between the combs, they are found in numbers at the bottom of the hive, they should be carried to a warmer place, where they will soon recover. In winters extremely severe, lay on the bottom of an old cask the depth of half a foot of very dry earth, powdered, and pressed down hard. On this, place the stool with the hive; and, to preserve a communication with the air, cut a hole in the cask, opposite to the entrance of the hive, in which fix a piece of reed, or hollow alder, and then cover the whole with dry earth.

In Britain, it is usual, in taking the honey, to deprive the bees of their lives. The common method is, to suffocate them with the smoke of brimstone; but Mr. MANLEY has adopted a more humane and judicious plan: he says, "I never destroy the old stock of bees; but after lifting them, to examine what honey there is, if I think the hive is full, I put another under it with a flat top, having a square hole in the centre. When the bees are in the under hive, I place a shutter, which is of wood, in the hole at the top; and that prevents them from going into the upper hive. I then invert it in a bucket, and strike it with a rod till I think they are all out, after which they go into the under hive."

Mr. WILDMAN gives the following instructions for taking the honey and wax: Remove the hive into a darkened room, that it may appear to the bees as if it was late in the evening; then gently invert the hive, and place it between the frames of a chair, or any other steady support, and cover it with an empty hive raised a little towards the window, to give the bees sufficient light to guide their ascent. Hold the empty hive, steadily supported, on the edge of the full hive, between the left side and arm, and continue striking with the right hand round the full hive, from the bottom upwards, and the bees being frightened by the noise, will ascend into the other. Repeat the strokes, rather quick than strong, round the hive, till all the bees are gone out of it, which will be in about five minutes. As soon as a number of the bees have got into the empty hive, it should be raised a little from the full one, that they may not return, but continue to ascend. When they are all out of the full hive, that in which they are must be placed on the stand, to receive the absent bees as they return from the fields.

If this is done early in spring, the royal cells should be examined, that any of them which contain young bees, as well as those in the other combs, may be preserved. These should on no account be injured; though, by sparing them, a good deal of honey be left behind. The combs should be cut from the sides and top as clean as possible, to save the future labour of the bees. During this operation, the hive should be placed, reclining to the side from which the combs are taken, and afterwards put for some time upright, that the remaining honey may run out.

Having finished the taking of the wax and honey, the next business is to return the bees to their old hive, for which purpose we must refer the reader to the directions already given, when we stated the usual method of uniting swarms.

By inverting the hive which contains the bees, and placing their own over it, they will immediately ascend, especially if the lower hive be struck on the sides to alarm them.

With regard to the increase of bees, Mr. HUBBARD, of Bury St. Edmunds, advises the owner to wait with patience, until he has acquired twenty stocks, and in the month of April to separate ten of the strongest hives for swarming; the other ten must be raised on large empty hives, the tops of which should be previously taken off, and the joinings of the two hives secured with a little clay; which plan prevents the bees from swarming. He also recommends the prime swarms from the other stocks, to be put into three-peck hives at least; for, when they appear very early, they will probably swarm again in a few weeks, which should always be prevented, and all the after-swarms be united, two or three into one; for the great advantage arises from a large quantity of bees being kept together; and, by that mode, ten stocks will generally yield fifteen good ones.

The manner of treating bees in *Portugal,* is as follows: A spot of ground is chosen for the hives, exposed towards the south or south-east, well sheltered from the northern blasts, and surrounded with shrubs and flowers; of the latter, rosemary is preferred. The richer the neighbouring grounds are, the better; for bees are said to range for food to the distance of a league from their home. Lanes are cut through the shrubby thickets, of five or six feet wide. The fences between the lanes are about the same dimensions, and formed at intervals into small recesses, like bowers or niches, to receive the hives.

The Portuguese hives, in general, are of a cylindrical form, and about twenty-seven inches high by fourteen in diameter. They are constructed of the rind of the cork-tree, and covered with an inverted pan of earthen ware, the edge of which projects over the hive like a cornice. The whole is fastened with pegs made of hard and durable wood, and the joints cemented with peat. In the front of the cylinder, at the height of about eight inches, there is a small aperture, where the bees enter. The inside is divided into three equal compartments, which are separated by cross sticks, on which the bees form their combs, or cells.

When they swarm, which is usually in May or June, the hives are placed to receive them, where they settle. If, on attempting to collect them, they fly away, a sheet is placed at night on the ground, contiguous to the swarm; and when they alight, the hive is put over them, with the entrance closed; then the whole is covered with the sheet, in which they are carried home. The honey-combs are taken out in June, during the heat of the day, but not if a high wind prevail, or at the commencement of a new or full moon. A person holds a chaffing dish, with a coal fire, covered with moist peat, to increase the smoke; which being introduced among the bees, from the top of the cylinder, they either escape, or remain intoxicated at the bottom; then the hive is taken to pieces, by drawing out the pins. The combs, except two cells around the hive, are cut out, without destroying the bees, and the incision is covered with pulverized clay. It is not advisable to remove them, until they be full of honey.

In this country, at former periods, many artificial methods have been invented and practised, with a view of stimulating the industrious bee to still greater exertions; and thus to increase the production of honey. Although we are no advocates for such schemes, nor do we give credit to the marvellous reports circulated to confirm their success, yet we consider the recipe given by the late Prof. BRADLEY, in his *Family Dictionary*, sufficiently curious, if not practically useful, to communicate it to our readers: Take a handful of sweet yeast, one dram of camphor, half a dram of musk dissolved in rose-water, a sufficient quantity of yellow bees-wax, and oil of roses (which last, however, being an expensive article, may be safely omitted); pound the first two ingredients well together, and put them into the melting wax; then add the oil of roses, and make it up into a mass, which should be cool, before the musk is incorporated with it. Of this composition, place a piece of the size of a hazel-nut at the side of a hive, and it will be found, that it not only increases the number of the bees, but also enables them to improve the honey, in the proportion of three to one. Yet the learned editor does not inform us, whether this improvement is productive of a superior quality, or larger quantity of honey, or perhaps of both.

With respect to the *Diseases of Bees*, we shall mention a few hints, extracted from the above-mentioned work.

Bees are sometimes afflicted with a diarrhœa, in consequence of feeding greedily on the blossoms of the milk-thistle, and elm. The best cure is, pounded pomegranate seed and honey, moistened with rich, sweet wine; or raisins mixed with similar wine or mead, in which rosemary has been boiled.—When they are infested with vermin, the hive must be cleansed, and perfumed with a branch of pomegranate, or the wild fig-tree, which will inevitably destroy them.

Butterflies are said to conceal themselves in the hives, and annoy the bees: these intruders may easily be exterminated, by placing lighted candles in deep tin pots between the hives; as the flame will attract them, and conduce to their destruction.

In order to extirpate hornets preying upon the honey, it is only necessary to expose shallow vessels near the hive, with a little water; to which these predatory insects will eagerly repair, to quench their thirst, and thus easily drown themselves.

To prevent bees of one society from attacking or destroying those of another, Dr. DARWIN recommends a board, about an inch thick, to be laid on the bee-bench, and the hive to be set on this board, with its mouth exactly on the edge; the mouth of the hive should also be contracted to about an inch in length, and a semi-circular hollow made in the board, immediately under the mouth of the hive. By this simple method, the assailing bees will be constrained to act with great disadvantage.

If, however, this should not succeed, Dr. DARWIN advises a removal of the bee-hive to a distant part of the garden, and to a more easterly aspect; as he has from experience observed the good effects of such a change. This acute philosopher farther observes, in his admirable "*Phytologia*," when treating of the glands and secretions of vegetables, that the depredations of insects committed on that nutritious fluid, *honey*, is probably injurious to the products of *vegetation*; and that some plants are more exposed and accessible to bees than others, which are either better defended, or secrete a greater portion of honey than is necessary for their own economy. Of the latter description are, the catch-fly, sundew, hellebore, and aconite: of the former, the Doctor mentions the *Polygonum melampyrum*, or Buckwheat, and the *Cacalia suaveolens*, or Alpine Colts-foot; in both of which there also appears to be a superabundant quantity of honey secreted. The flowers of the two last-mentioned plants are perpetually loaded with bees and butterflies; insomuch, that at Kemptonland, in Germany, Mr. WORLIDGE says, in his "*Mysteries of Husbandry*," chap. ix. 3, he saw forty great bee-hives filled with honey, to the amount of *seventy pounds in each, in one fortnight*, by their being placed near a large field of buckwheat in flower; and Dr. DARWIN adds, that he well remembers having seen an astonishing number of bees on a field of buck-wheat in Shropshire, as well as on a plant of the alpine colts-foot in his garden; from which the scent of honey could be perceived at several feet distance from the flower.

To conclude this interesting subject, we cannot omit the judicious remarks of a veteran writer, Dr. J. ANDERSON, whose numerous and useful works, in every branch of rural and domestic economy, are of inestimable value to the British farmer. In one of his practical papers, "*On the Management of the Dairy*," communicated to the Bath and West-of-England Society, he observes in a note, that bees, in this variable climate, are a very precarious stock, though extremely profitable where they thrive. During the frequent mild days of winter, and the warm mornings of spring, which are suddenly succeeded by a nipping frost, or sleety rain, these creatures are roused from their torpid state; and, being unable to obtain food abroad, they are obliged to consume and exhaust their stores, and to perish from want. And as the warmth of the weather in spring invites them to search in vain for flowers affording them nourishment, they are often chilled by cold, before they are able to return to the hive. To prevent such fatal accidents, Dr. ANDERSON is of opinion, that no method would be so effectual as that of placing the hives in an ice-house, at the approach of winter. Here they may be kept till the spring has so far advanced, that no danger is to be apprehended from bad weather. During the whole winter, they will remain in a state of torpor, and require no food. As soon as the mild weather incites them to appear, they will commence their labours with vigour. The intense degree of cold which the bees sustain, without the least injury, in Poland and Russia, where even quick-silver is sometimes frozen, removes every doubt, or anxiety, concerning the safety of bees in a British ice-house.

BEES'-WAX, a solid concrete, obtained from the honey-combs, after the sweet and liquid parts are extracted, by heating and pressing them between iron plates. The best sort should be hard, compact, of a clear yellow colour, and an agreeable odour, similar to that of honey. Pure bees'-wax, when new, is tough, yet easily broken: by long keeping, it becomes harder and more brittle, loses its fine colour, and partly also its fragrance.

The purposes to which bees'-wax is applied, are various: great quantities of it are annually bleached, and converted into candles. On account of its softening and healing nature, it is much used in cerates, plasters and ointments.

Artificial wax may be extracted from many vegetable substances, especially from the flowers of the lime-tree, by a chemical process; but we doubt whether the expence attending this experiment would, in this country, be equivalent to the advantages. It is, however, certain, that *wax* is contained in a much greater number of vegetables than has hitherto been supposed; and it may easily be extracted from the leaves of most plants and trees, as is manifest from their shining cover, or varnish, which generally consists of waxy matter. This concrete also forms an ingredient of several resins; and may be separated from gummy, mucilaginous, and saccharine matters, by simple water; from saponaceous substances, by water or spirit of wine; and from resinous bodies, by means of vitriolic æther.

Bee-Bread is a species of crude wax, collected by the working-bee from the farina of flower-cups, conveyed to the hive in the hollows of its hind-legs, and deposited in the cells with the egg, to serve as food for the young maggot.—This substance often varies in colour, according to the different flowers from which it is separated; and though generally white at first, it is afterwards changed, by the impurities arising from the steam, &c. of the bees. In some hives, this crude wax is said to amount to one hundred weight in a season, if the total consumption of these voracious young maggots be calculated in proportion to the incessant labour of their supporters; though the real wax in the whole hive may perhaps not exceed two pounds weight.

Bee-Glue, formerly called Virgin-wax *(Propolis)*, is another balsamic production of the bee, which deserves to be noticed: it is a kind of natural mastich, of a reddish colour, and very agreeable smell. Small pieces of it are frequently found in the holes and crevices of the hives, where it is employed by those little artists, as a cement for excluding cold, rain, and noxious insects.

In the immense forests of Poland and Russia, where bees select their own habitations in the hollow trunks of trees, the bee-glue is deposited in much larger pieces, and of a superior flavour, to what is obtained in countries where these insects are reared by the aid of art. The inhabitants of the former, generally use it as a vulnerary application, to promote the healing of fresh wounds, Dr. James, in his "*Medicinal Dictionary*," praises the bee-glue as being gently heating, abstergent, and attracting: it softens indurated parts, alleviates pains, and induces cicatrices on ulcers."

Stings of Bees are more virulent than even those of wasps, and sometimes attended with very violent effects. As the sting is barbed, it is always left in the wound. When, therefore, a person is stung by a bee, the sting should be instantly extracted; for, by its peculiar form, it will penetrate progressively deeper into the wound, and communicate more of its poison, according to the time it is suffered to remain. It should be carefully pulled out with a steady hand; for, if any part of it breaks in, remedies will in a great measure be ineffectual. When the sting is completely extracted, the wounded part should be sucked; and little, if any, inflammation will ensue. If a few drops of spirit of hartshorn be immediately rubbed on the part affected, the cure will be more speedily accomplished. This spirit, however, acts only as a stimulating anti-spasmodic, enabling the vessels to overcome the spasm formed on their extremities. An application of Goulard-water, or a cold saturnine poultice, would produce a similar effect.

Another simple remedy, equally efficacious and expeditious, is a solution of indigo in water; speedily applied to the injured part.

Honey and olive oil may also be occasionally substituted with advantage; but their application should be repeated till the pain ceases.

BEECH-TREE, or the *Fagus*, L. a plant of which there are three species, viz. 1. The *sylvatica*, or beech-tree, which rises sixty or seventy feet high; 2. The *castanea*, or chesnut-tree; 3. The *pumila*, or dwarf chesnut-tree; and 4. The *Americana*, or American chesnut-tree. At present, we shall confine our account, consistently with the alphabetical order, to the first-mentioned species.

This tree is easily raised from the mast, or seeds. If intended for woods, it requires the same management as the oak; in nurseries, it should be treated like the ash; by sowing the mast in autumn, or even as late as January, to preserve it from vermin. HANBURY recommends, that a sufficient quantity of mast be gathered about the middle of September, when it begins to fall; it should be spread upon a mat in an airy place to dry, after which it may either be sown immediately, or preserved in bags till the spring: the latter, method, however, is preferable. It must be sown about an inch deep, in beds properly prepared. Several of the young plants will appear early in spring; but others will not come up till the spring following. After having remained two years in this state, they ought to be transplanted to the nursery.

In the year 1791, JOHN HOLLIDAY, Esq. of Dillorn, Staffordshire, planted 113,500 trees of different kinds; among these, the principal were ninety-four thousand beech. His method of planting was, to make a round hole about the diameter of two spades; to preserve the best turf, and place it on the south-west side, which, by experience, has been found to answer two useful purposes, namely, that of protecting the young plant from the storms of winter, and shedding the best soil in the bed of the hole, both winter and summer. It is but justice to observe, that this gentleman received the honorary reward of the gold medal from the Society for the Encouragement of the Arts.

The beech is the most beautiful tree our island produces. In stateliness and grandeur of outline, it vies with the oak. Its foliage is peculiarly delicate and pleasing to the eye, and therefore preferable to the lime, for ornamental plantations, particularly in parks, where the mast in fruitful years will be serviceable to the deer: its branches are numerous and spreading, and its stem grows to a great size. The bark is extremely smooth and silvery, which, together with the elegance of its foliage, gives a pleasing neatness and delicacy to its general appearance. Beeches thrive best on calcareous hills, and abound on the bed of chalk which runs from Dorsetshire, through Wiltshire, Hampshire, Surrey, Sussex, and Kent; though they may also be met with in almost every county in England.

An anonymous writer on agriculture, says, that "great care should be taken to remove the beech from woods, that oaks may thrive: without this precaution oak-forests have become of less value by several hundred pounds, from the intrusion of the beech."

In Hereford and Monmouthshire, the beech is converted into charcoal; and, in several counties, its leaves are used for beds, instead of feathers. They certainly have this advantage over feathers, that they may often be changed at a trifling expence.

The wood of this tree is almost as necessary to the cabinet-makers and turners of the metropolis, as oak is to the ship-builder; it is, however, very liable to be attacked by a worm which soon destroys it: this worm is supposed to feed on the sap that remains in the wood, consequently, the best method of preserving it, is to extract the food on which the worm subsists.—For this purpose, scantlings of beech, when large, should be laid to soak in a pond for several weeks, according to the size of the timber, and the season of the year. In the heat of summer this effect is more speedily produced. As the planks or boards are in danger of warping, they should be exposed to dry, but sheltered from the sun and rain; laths ought to be placed between the boards, to prevent their contact, and the whole pressed by a considerable weight. If they are large pieces for beams, joists, &c. they need only be left to dry gradually under sheds.

By the first of these methods, the timber, when applied to use, will be found as good and durable as elm. It is, however, advisable, when beech is used, to prepare that part of the timber which touches the brick-work, with a thick coat of pitch, to guard it against the effects of moisture. It should be felled in the heat of summer, when full of sap, which may then be more readily extracted from the wood than in winter.

Beams and thick planks should remain about twenty weeks in water; joists and rafters, about twelve weeks; and the thinner boards, about two months; but afterwards they should all be gradually dried.

When this wood is intended for small work, such as chairs, or turnery, it is recommended to erect a large copper, sufficient to hold two hogsheads, in which the wood may be boiled for two or three hours. This mode of preparing it extracts all the sap, makes it work more smoothly, and renders it more beautiful and durable.

BEECH-NUT or, as it is more generally called, *Beech-Mast*, is the seed or fruit of the beech-tree, and is recommended for feeding and fattening hogs. These animals may be secured from the *gargut*, by moistening some pease or beans with water, sprinkling them with powdered antimony, and repeating this medicine every other day, for a fortnight. The same precaution should be used when hogs are fed upon acorns. In Hertfordshire, where beech trees grow spontaneously, swine are kept upon the mast only, and turned out about the middle of October, or sometimes sooner. On this food they thrive very fast, and generally afford fine meat. When a hog is intended to be killed for pickling, it should be previously taken home for a month, or five weeks, and fed with pollard, barley meal, or pease. It has, however, been remarked, that the flesh of swine fed upon beech-mast, is of too soft a nature, and easily boils away.

When these nuts are eaten by the human species, they occasion giddiness and head-ach; but after being well dried and ground, they have been found to make wholesome bread: they have also occasionally been roasted, and used as a substitute for coffee.

BEECH-MAST OIL, is expressed from the mast, after it has been shelled and pounded. It is used in many parts of France and Silesia instead of butter; according to some accounts, it is little inferior to oil of olives. After the oily part has been extracted, the remainder of the mast, when dried, is said to be sweeter and more palatable than before, and may be easily converted into flour, of a similar taste and colour to that of wheat.

In order to obtain pure oil, the following circumstances must be attended to: 1. The fruit must be carefully selected, and all musty, rotten, or tainted nuts, particularly those of the former year, should be rejected.

2. The shell of the nut should be taken off, which is necessary not only for increasing the quantity, but also for improving the quality of the oil, because the husk communicates a particular flavour.

3. The film which surrounds the kernel, should then be removed, an operation which is essential to the perfection of the oil and the flour; for the film, though small in quantity, has an astringent disagreeable taste, which is plainly perceptible in both the oil and the flour, where its removal has been neglected. It may be separated by putting the kernels into hot water, as is practised in blanching almonds.

4. After the nuts are gathered, they should be preserved for two or three months in a dry place, so thinly spread out as not to allow them to heat, and often turned, to keep them sweet; then bruised like apples in a cyder mill. In this state, the mass should be put into bags of strong thin canvas, and pressed cold. The oil must be extracted by three degrees of pressure: the first moderate, which gives the purest and finest oil; the second harder, which yields it of an inferior quality; and the third as forcibly as the materials will bear, from which an oil of an indifferent quality is obtained. After each separate pressure, the bag should be turned, and the mast, after being well shaken, may be preserved for use.

It has been asserted, that the mast, though three times pressed, is more nutritive than in its natural state. It may, therefore, not only be given as a wholesome food to poultry, swine, and oxen, but also be manufactured into hair-powder.

BEEF, the flesh of black cattle, prepared for food. This process is managed in various ways, accordingly as the meat is intended for keeping a longer or shorter time. The usual method of salting beef, being generally known, we shall refer to the article "BACON," and briefly observe, that much depends, 1. On the purity and quantity of the salt used for this purpose; 2. On the size of the pieces; and the nature of the vessels in which they are kept; and 3. On the ingredients which may be employed with a view to assist the operation of the salt.

It is an established fact, that salt proves antiseptic only when used in a considerable quantity; and that a *weak* brine strongly tends to hasten the putrefaction of animal substances: hence the necessity of making a liberal use of this article. On the other hand, as common sea-salt contains a very considerable proportion of *magnesia*, one of the most absorbent earths for promoting putrefaction, it is attended with great inconvenience to those who are obliged to make use of large quantities of such salt; because it is difficult to separate that ingredient from this concrete.

Hence *rock-salt*, though apparently more impure, is doubtless more advantageous, and proper for the curing of beef; because its crystallization has been accomplished by Nature, probably after the more earthy base, or magnesia, had, in a great measure, spontaneously subsided. We offer this as a mere conjecture; as it is of little importance to the economist, how this combination of salt and putrefactive earth has originally taken place, if we can suggest a method of purifying the former, so as to render it fit for the purpose intended: See Salt. At present, however, we shall treat first of the manner which, by experience, has been found the most effectual for salting, preserving, and imparting a fine flavour to beef, mutton, and pork. For this useful information we are indebted to M. Schedel, who has inserted the following recipe in the "*Economical Journal*," for September 1795, printed at Leipzig: Take four pounds of common salt, one pound and a half of refined sugar, two ounces of salt-petre, and two gallons of pure spring water. Boil the whole over a gentle fire, and carefully scum off the impurities. After this brine has become cold, pour it over the meat, so that every part of it may be completely covered. In this preparation, the meat not only keeps for many months, but the pickle also has the effect of softening the hardest and toughest beef, and rendering it as mellow as the flesh of chicken. But, in warm weather, it will be necessary to express the blood from the meat, and to rub it well with fine salt, before it is immersed in the liquor.—Young pork should not be left longer than three or four days in this brine, during which time it will be sufficiently softened; but hams intended to be dried, may lie in it a fortnight, before they are suspended. At that period, they ought to be rubbed with pollard, and covered with paper bags, in order to prevent them from becoming fly-blown. It farther deserves to be remarked that, though this liquor is more expensive at first than the common brine, yet as it may again be used after boiling it, and adding more water with a proportionate quantity of the other ingredients, its relative utility is obvious. We understand that the late Empress of Russia employed this composition with uniform success, in her household economy.

A very curious experiment was tried, in the year 1736, before the commissioners of the Victualling-Office, relative to the salting of beef. Both jugular veins of a bullock were opened, and the animal bled almost to death: the carcase was then cut open, the intestines were taken out, and while warm, a tube was introduced into one of the large arteries, which was injected with a strong brine: this circulated through all the blood vessels, so that the flesh of the bullock was (apparently) salted alike throughout the whole body; for, on cutting a piece of the leg and lip, the brine issued from those parts. Some of this beef was then stowed, and sent to sea, with a view to ascertain how long it would keep in that state: but the result of the experiment has not been published. Indeed, it is not difficult to foresee the event: as the arteries were no longer possessed of the power of absorption inherent in the living body, the muscular fibre, not being saturated with the saline liquid, would necessarily putrify.

As to the properties of beef, in general, we shall only say, that it affords a good, strong, and invigorating nutriment, because no animal food is equal to the flesh of a healthy, middle-aged bullock. Plethoric persons, however, as well as youth, in whom there is naturally a disposition to generate heat, should eat beef in great moderation. Hence, it is most serviceable to the robust and active adult, employed in manual labour, who digests both fat and lean with equal facility. Yet, when salted, even the most tender beef is deprived of a great portion of animal jelly, so that we may without hesitation pronounce, that one pound of fresh beef is equal to one pound and a half in a salted or pickled state.

BEEF-TEA, a preparation commonly made for persons whose energy of the stomach is reduced, either after recovery from diseases, or in consequence of complaints arising from indigestion. It has been a common practice, to treat valetudinarians, or patients, with viper-broths, instead of beef-tea: the former, however, does not appear to possess any superior efficacy, though it certainly is more nauseous than the latter.

Beef-tea is usually made, by cutting one pound of the lean part of a buttock of beef into very thin slices, or shreds, and boiling it with nearly a quart of water: when it grows hot, the rising scum must be taken off, while it continues boiling for about twenty minutes. After it grows cold, this liquor is strained and decanted; in which state it resembles a light infusion of fine green tea: has a very grateful flavour, and is more stregthening than other broths. This recipe is similar to that given by the late Dr. BARRY, in his classical "*Treatise on the three different Digestions and Discharges of the Human Body*," &c. 8vo. 6s. 1759. But, on considering the effect of heat on the volatile and spirituous parts of the animal fibre, when immersed in a fluid medium, we venture to suggest a more economical method of preparing beef-tea. Instead of boiling the meat, we would advise to reduce it to a pulp (provided it be perfectly clean and fresh) with a wooden pestle, in an iron or marble mortar, and then to express all its juice. After straining this liquor, a little spice may be added, and an equal, or larger proportion of boiling water. Thus, the whole essence of the meat will be preserved, part of which would be volatilized by cooking. Nor does it admit of a doubt, that such a liquor possesses greater bracing powers, than if prepared after the usual manner; and that half a pound of beef in this way, is nearly equal to one pound used according to the former method.

It is, however, a common error, that beef-tea, or any other broth, is more easily digested than solid food: on the contrary, all liquid nutriment of this nature, unless mixed with bread, rice, barley, or other vegetable aliment, requires much stronger efforts of the stomach to effect digestion. Hence we are induced to deprecate the custom of inundating, as it were, patients, after their recovery from chronic diseases, with soups, broths, and spoon-meat of every description.

BEER is a fermented, spirituous liquor, prepared from any farinaceous grain, but generally from barley; and, strictly speaking, is a vinous production, serving as a substitute for wine.

As we propose to give a short analysis of the art of BREWING, under that head, we shall here only observe, that all kinds of beer are produced by extracting a proportionate quantity of malt, whether made of wheat, barley or oats, in boiling water; then suffering it to remain at rest, in a degree of warmth requisite to induce a vinous fermentation, and afterwards managing it in the manner as will be described under the article just mentioned.—See also FERMENTATION, and MALT.

Although malt alone might doubtless produce a liquor possessing the spirituous properties of beer, yet such a preparation would speedily turn sour and insipid, unless impregnated with hops, or another aromatic and bitter principle, derived from vegetable substances, which not only render it less liable to undergo the putrefactive stage of fermentation, but also impart to it an agreeable bitterness. Of this nature is the hop in a very eminent degree, the price of which, however, has of late years been so exorbitant, that speculative brewers have substituted a variety of other vegetable ingredients, and especially the wood, bark, and root of *quassia* (which see.) Independently of the inferior price of this drug, when compared to the indigenous hop, there can be no reasonable objection to its use; as it is one of the few astringent substances possessing a considerable share of the bitter principle, without partaking of the narcotic, heating, and intoxicating properties of other plants.

It would be difficult to lay down an accurate criterion of the best and most wholesome beer; as its relative strength and flavour, or the immediate effect it produces on the palate, are generally considered the most essential requisites. But a well-brewed and wholesome beer, whether ale or porter, ought to be of a bright colour, and perfectly transparent, that is, neither too high nor pale; it should have a pleasant and mellow taste, sharp and agreeably bitter, without being acrid or tart; it should leave no particular sensation on the tongue; and, if drunk in any considerable quantity, it must neither produce speedy intoxication, with its concomitant effects of sleep, nausea, vomiting, head-ach, languor, want of appetite, &c. nor should it be retained too long in the urinary passages, or be too quickly discharged.

Dr. JAMES STONEHOUSE, of Northampton, inserted the following recipe for making *Beer* of *Treacle*, in the Gentl. Mag. for January, 1758: "To eight quarts of boiling water, put one pound of treacle, a quarter of an ounce of ginger, and two bay leaves. Let the whole boil for a quarter of an hour, then cool and work it with yeast, the same as other beer:" or, "Take one bushel of malt, with as much water and hops as if two bushels of malt were allowed; put seven pounds of the coarsest brown sugar into the wort, while boiling. This makes a very pleasant liquor; is as strong, and will keep as long without becoming sour or flat, as if two bushels of malt had been employed."—Dr. STONEHOUSE adds, that the latter is the preparation used in the Shrewsbury Infirmary, and he does not hesitate to attest its wholesome and nutritive properties.

In the sixth volume of the *Museum Rusticum et Commerciale,* a work of considerable merit, we meet with a similar account of making a kind of *Table Beer,* which, from its cheapness, and agreeableness, is greatly preferable to that obtained from malt; and which has this farther advantage, that it may be made ready for drinking in three or four days:—"Take fifteen gallons of water, and boil one-half of it, or as much as can conveniently be managed; put the part of the water thus boiled, while it is yet of its full heat, to the cold part, contained in a barrel or cask; and then add one gallon of molasses, commonly called treacle, stirring them well together: add a little yeast, if the vessel be new; but, if it has been used for the same purpose, the yeast is unnecessary. Keep the bung-hole open till the fermentation appear to be abated, and then close it up. The beer will, in a day or two afterwards, be fit to drink.

"It is usual to put tops of the spruce fir into the water which is boiled for making this beer; and it is then called *spruce beer.* But, though this is done at sea, when such tops can be obtained, on account of the scurvy; yet it is not necessary, and may very well be omitted, where they are not to be easily procured. Scurvy-grass, or other herbs or drugs, used in making purl, gill-ale, or any other flavoured malt liquor, may be added at discretion. But a little of the outer rind of an orange-peel, infused in the Beer itself, and taken out as soon as it has imparted a sufficient degree of bitterness, will both be found grateful, and assist in keeping the beer from turning sour. A very little gentian-root, boiled in the water, either with a little orange-peel, or without, gives also a very cheap, wholesome, and pleasant bitter to this beer."

The philanthropic editor of the "*Reports of the Society for bettering the Condition, and increasing the Comforts of the Poor,*" T. BERNARD, Esq. very justly observes (in a note, vol. i. p. 194), "that it would be a very desirable thing, that the poor should be able to supply themselves with beer of their own brewing, without being obliged always to recur to the alehouse. I am aware of the disadvantage of brewing in small quantities; but that might be compensated for by great advantages, and by the superior flavour of beer *brewed and drank at home.*—The following recipe is according to the proportions used in the House of Industry, at Shrewsbury: To half a bushel of malt, add four pounds of treacle, and three-quarters of a pound of hops; this will make twenty-five gallons of beer; the cost of which (supposing the value of the grain to be only equal to the expence of fuel), would be two-pence a gallon, where the materials were purchased to the best advantage; and, when bought at the retail shop, about three-pence. I have tried the receipt, and found the beer very good: it was fit for use in a fortnight; but it is not calculated for keeping, particularly in warm weather."

We have been induced to communicate these different methods of preparing a *pure* and wholesome beverage, in order to contribute our mite, however small, towards alleviating the burthens of domestic life, at the present critical period. And though we should not succeed in persuading many persons, in the middle ranks of society, to adopt our suggestions, we still may flatter ourselves with the chearing hope, that they will humanely exert their influence on such families as may be benefited by brewing their own liquors at home: instead of carrying, perhaps, one-half of their weekly earnings to the next ale-house, and debarring their helpless children from that necessary assistance, for want of which, they are often doomed to become additional burthens on the parish.

Having pointed out the peculiar qualities of good beer, as well as the most easy and advantageous methods of using a substitute for malt, we shall next consider the most effectual way of clarifying this grateful beverage; and of preventing it from turning sour, or restoring it to its former briskness, when it has, by mismanagement, acquired a tart or insipid taste.

Various schemes have been proposed, and many also adopted in breweries, for *fining* or *clarifying* different beers. But, as the superior brilliancy and transparency of that liquor, depend in a great measure on the quality of the malt and water—which properly belongs to the article "Brewing"—we shall here speak of that process only so far as it relates to the management of beer, after it is fermented.

In Britain, malt liquors are generally fined with ground-ivy, the *Glecoma hederaca*, L.; which plant, however, will not produce the desired effect, if the beer has been brewed of bad malt, or otherwise mismanaged during the different processes of boiling and fermenting the wort. In such cases, and especially if it has been too long boiled, the liquor may indeed become clear, by throwing into it an additional quantity of ground-ivy; but it will retain an opacity, or turbid appearance, because this useful plant, being at first lighter than the liquid, and swimming on the top, gradually becomes heavier; and though it combines with the impurities of the liquor, and at length sinks to the bottom of the vessel, yet it is incapable of correcting and decomposing those mucilaginous and empyreumatic particles, which partly arise from inferior malt, and are partly extricated by the action of too great and long-continued heat. Hence we shall propose the following simple remedy, which was communicated to us by a continental friend: After the beer is properly fermented, and a few days old, take one gallon out of every barrel, and add two ounces of hartshorn-shavings (or filings, which are still better) to every gallon. Place the liquor over a moderate fire, till it boils, and rises to the top; let the decoction stand for an hour or two; and, when milk-warm, pour the clear part of it into the barrels, according to the proportion before specified. In this state, the casks must be left undisturbed for twenty-four hours, and then the beer should either be bottled, or drawn off into other vessels. This easy and cheap process, not only has the effect of completely clarifying the beer, but likewise preventing it from turning sour, especially if it be laid up in bottles properly corked, and secured with a cement consisting of nearly equal parts of melted bees'-wax, resin, and turpentine.

There is also considerable damage to be apprehended from the effects of a thunder-storm, by which ale or beer is apt to become turbid and flat, not only at the time when undergoing the critical process of fermentation in the tub, but likewise after it has been barrelled.

In the former case, we are not acquainted with a better method than that of placing (on the approach of a tempest) several vessels filled with lime-water, or where this cannot be immediately procured, only simple water contiguous to the fermenting vat; and, if it be convenient, both fluids in their several vessels should be on a level, or the beer might be somewhat lower than the water; which attracts and absorbs the then prevailing acidity of the atmosphere.

In the latter case, the injurious influence of thunder may be effectually prevented, by laying a solid piece of iron on each cask: this easy expedient we find recorded in the *Gentleman's Magazine*, for January 1753; and the anonymous writer adds, that the fact is accounted for in one of the volumes of the "*Athenian Oracles.*"

In summer, especially in what is called the bean-season, when all malt liquors are liable to become flat, the following remedy is often successfully employed as a preventive: Take a new laid egg, perforate it with small holes, put it in a clean linen bag, together with some laurel-berries, and a little barley; then suspend it in the vessel containing the beer:—instead of the berries and barley, a few leaves of the walnut-tree may be substituted. Others put salt made of the ashes of barley-straw, into the vessel, and stir it till it be incorporated; or, if the beer is not very sour, a small quantity of such ashes, or calcined chalk, oyster-shells, egg-shells, &c. may be suspended in a similar manner, in order to absorb the acidity of the liquor, and recover its former sweetness.

Sour Beer, however, cannot be easily restored in the manner above stated, without undergoing a new process of fermentation, or impregnating it, for that purpose, with fixed air. But as the latter is an expensive and troublesome method, we shall communicate another of more easy application. GLAUBER recommended his *sal mirabile* (common Glauber's salt), and saltpetre, to be put into a linen bag, and suspended from the top of the cask, so as to reach the surface of the liquor: thus the beer will not only be preserved and strengthened, but it may also, when flat, or sour, be restored to its former briskness. The experiment may be easily made; but we cannot vouch for its result.

Another, and a better remedy, for recovering tart, or insipid beer, is the following: add to every pint of such beer, from twenty to thirty drops of what is commonly called *oil of tartar* (salt of tartar, or pure pot-ash, reduced to a liquid state, by exposing it to the influence of the air in a cellar, or other damp situation); then mix it in the vessel, and the acidity will be quickly neutralized.—Those who live at a distance from apothecaries' shops, or wish to prepare this liquid tartar, for occasional use on journeys, especially in summer, may easily make it, by dissolving two ounces of fine pearl-ashes in eight ounces, or half a pint, of pure water, frequently shaking the bottle, then suffering it to stand for twenty-four hours, and afterwards filtering the solution through a fine cloth. In this state it may be preserved for one year; but beer thus restored ought to be drunk soon after it has recovered its briskness, or at least on the same day: and this small addition of vegetable alkali is, in warm seasons, rather conducive, than detrimental to health.

When beer has acquired a peculiar *taste of the cask*, either from an unclean state of the vessel, or, by long keeping, from the astringency of the oak, it is advisable to suspend in it a handful of wheat tied up in a bag; which generally removes the disagreeable taste.

With respect to the physical properties of malt-liquors, we shall observe, that they are possessed of various degrees of salubrity, according to the proportion and nature of their ingredients, namely, water, malt, and hops, of which they are composed; and likewise, according to the manner in which they have been brewed. If, for instance, a large proportion of water has been used, the beer will be more proper for quenching thirst, than if it were strongly impregnated with the mealy and spirituous particles of the malt. Hence, strong and sweet beer is the most nourishing and beneficial to thin and emaciated persons; stale and bitter ale, the most intoxicating; and weak, half fermented porter, the most flatulent, and least serviceable to nervous, debilitated, hysteric, or asthmatic constitutions. But, as there is no peculiar test, by which we can ascertain with critical accuracy, when the vinous fermentation is *completed*, and the acetous has *commenced*, every kind of beer must be barrelled, or bottled, before it is *perfectly* fermented, so that the completion of this natural process is effected in the stomach and bowels. Strange as this proposition may appear to some persons, it is so true, that the infinite diversity of flavour and briskness obtained from the same mixture, when drawn off into different vessels, or bottles, cannot fail to strike the most superficial observer.

Beer always contains a portion of fixed air, which being disengaged within the human body, is apt to occasion flatulency and looseness. To the mariner, however, and those who are subject to scorbutic complaints, it is, in general, a wholesome beverage, though we cannot refrain from animadverting upon the prevailing, erroneous notion, that ale or porter *promote* digestion: this is refuted by the uniform evidence of experience, whence it clearly appears that, of all liquids whatever, *pure water* is the most beneficial solvent of animal and vegetable substances. Such individuals, therefore, as make use of nourishing, and principally animal food, require *no* beer for its digestion; as the habitual drinking of malt liquors will expose them to all the inconveniencies of plethora, or a full and gross habit. Others, however, who live chiefly on vegetable diet, and whose stomach is weak or impaired, may be greatly invigorated by a *moderate* use of *strong* and *bitter* malt-liquors—a purpose which the common table beer cannot answer. Persons of dry and rigid fibres, and whose bile is duly secreted, ought to drink such beer as is sufficiently strong and nourishing, without being of an intoxicating nature: for this purpose, we would give the preference to *Bell's Beer*, over Burton, and other ales.—A thin, weak, and well-fermented beer, is diluent and wholesome; whence it agrees well with the plethoric, and persons disposed to corpulency. On the contrary, thick and nourishing malt-liquors are most serviceable to the debilitated, and especially to wet-nurses; consequently *sweet* beers are chiefly nutritive, and more proper for daily use, on account of their being least exposed to dangerous adulterations; while the *bitter* kinds possess medicinal properties, and should be drunk in a weak state of digestion, by individuals subject to acidity in the stomach.

Lastly, every kind of beer is improper for the hysteric, the hypochondriac, and all those who are already of a full habit, or manifest a thick, atra-bilious blood; but it is of peculiar service to the laborious, the lean, emaciated, and all such constitutions as are not liable to flatulency, or any organic diseases of the breast.

BEESTINGS, or Breastings, in domestic economy, a term used for the first milk drawn from a cow after calving.

This liquor is of a thick consistence, and yellowish colour; whence some persons have imagined, that it is impregnated with sulphur. As Nature has peculiarly designed the beestings for the purpose of cleansing the young animal from those viscid impurities which, in the human subject, are denominated the *meconium*; it appears rational, that the calf should partake of this benefit. Nor is this strong and viscid liquor calculated to afford a wholesome food; though farmers, in general, give it to the indigent cottager. And, as it is frequently eaten by children, who are scarcely able to digest it, we are of opinion, that it might be better employed in feeding young calves, or by converting it into cheese.

BEET, or *Beta*, L. a plant of which there are four species, viz.

1. The *maritima*, or sea-beet, which grows spontaneously by the sea side; and in salt marshes in many parts of England.

2. The *hortensis*, or common white beet, is cultivated in gardens for its leaves, which are frequently used in soups. The root of this species seldom attains a greater size than that of a man's thumb; the varieties are the white beet, the green beet, and the Swiss, or chard beet: these vary from one to the other, but have never been known to change to the first or third sort.

3. The *vulgaris*, or red beet, the roots of which are large, and of a deep red colour. It is worthy of remark, that the larger these roots grow, they are more tender; and the deeper their colour, the more they are esteemed. The varieties of this species are the common red beet, the turnip-rooted beet, and the green-leaved red beet.

4. The *cicla*, which grows wild on the banks of the Tagus, in Portugal; it is originally a small, white root, but there is a variety of it, called by the Germans *Runkelrübe*, or the *Beta albissima* of Botanists, the culture of which cannot be too strongly recommended. The stalk of the latter grows to the height of seven or eight feet; and the root weighs from eight to twelve pounds. This variety of the root of scarcity

is the true *Mangel-wurzel,* which some years since excited much attention in Britain; though there is reason to suppose that other species of the beet have been frequently mistaken for the Beta albissima; the root of which is white, juicy, and streaked with red fibres: it is sown like cabbage, and to prevent injury to the fibres of the root, the young plants must not be pulled, but dug up with a spade; they should then be transplanted on the same day (either in rainy weather or after sun-set), on a rich well-ploughed and manured soil, in rows, from sixteen to eighteen inches asunder. The roots, however, will not arrive at perfection, unless the plants be twice hoed, at least, and stripped of the superfluous leaves every fortnight, or three weeks.

From the first and third species before-mentioned, some German chemists have extracted sugar; but the difficulty and expence attending the process are so considerable, that this vegetable will never be worthy of the particular attention of the gardener for this purpose; though it will always deserve to be cultivated as food for man and cattle.

The common white, as well as the red beet, should be sown separately in the beginning of March, upon an open spot of ground. It requires a rich soil (such as is fit for wheat), and a low situation, which may be watered occasionally. The ground should be thoroughly cleared of weeds, and manured at least a year before it is sown. As the manuring is a matter of great importance, it should be repeated before the soil is ploughed, which ought to be performed three times. Immediately after the third ploughing, the ground should be carefully harrowed. A rake, with teeth from nine to twelve inches distant, should be drawn across it, so as to mark lines, which must be crossed by others transversely. If the seed be fresh and sound, one is sufficient, but if doubtful, two may be dibbled about the depth of an inch, at each of the points where these lines cross.

When the plants have acquired six or eight leaves each, the ground should be thoroughly weeded; care being taken not to deprive them of the surrounding soil. If more than one plant appear on the same spot, the superfluous ones must be removed; and wherever a seed has been unproductive, another should be sown. When the ground is quite cleared from weeds, the plants grow rapidly, and all farther care is unnecessary.

The harvest generally commences about the end of September. The root should be dug up with great care, and the leaves and stalks cut off, to prevent it from growing; but, in performing this operation, though it is necessary to cut them close, great care must be taken that the root itself be not injured.

In the year 1755, M. LULIN DE CHATEAUVIEUX, being of opinion that a great part of the expence of dung and labour might be saved, if *pot-herbs* could be cultivated in the same manner as wheat according to the new husbandry; he sowed a bed forty feet long and six wide, with beet, and two others with carrots. Where the plants grew too thick, they were thinned, so as to leave a distance of fourteen or fifteen inches between the beets, and seven or eight between the carrots: neither of them were watered. On digging up the beet-roots, in October, they were all nearly five or six inches in diameter. He ascribes their luxuriant growth to the method of culture without manure.

According to Mr. Rocque, the *white beet* is a most excellent fodder for cows: the best way of feeding them, is to mow the plant, and give it to them fresh during the summer.

The *red beet* is possessed of mild aperient qualities, and affords but a weak nutriment to the human body. Hence it should be eaten for supper, by persons of a costive habit: but, though it be easily digested, its use is sometimes attended with flatulency; for which reason, it would be more wholesome and nourishing, to eat the beet with other more mealy roots, such as potatoes; or with those of an aromatic nature, for instance, parsley, celery, &c.

BEETLE, or *Scarabæus*, L. a well-known insect, of which there are eighty-seven species, of one common formation, having cases to their wings, which are the more necessary, as they mostly live beneath the surface of the earth. Besides their diversity of shape and colour, the difference in the size of the various species is also considerable, some not being larger than the head of a pin, while others, as the elephant beetle, are as big as a closed hand.

The May-bug, or cock-chaffer, is the species most deserving of our notice, on account of the formidable ravages it commits on the territory of the husbandman. In some seasons, it has been found to swarm in such numbers, as to devour every vegetable production; our principal object, therefore, will be to point out the best means for its destruction. It is necessary to observe, that the insect is first generated in the earth, from the eggs deposited by the fly, in its perfect state. About three months afterwards, the insects contained in those eggs break the shell, and crawl forth in the form a small grub or maggot, which feeds upon the roots of vegetables; and continues in this concealed and destructive state for more than three years, gradually growing to the size of a walnut. It is the thick white maggot with a red head, so frequently found on turning up the earth. At the end of the fourth year, these extraordinary insects emerge from their subterraneous abode; when, in the mild evenings of May, an attentive observer may perceive them rising from the earth in numbers before him.

The willow seems to be their favourite food; on this tree they hang in clusters, and seldom quit it till they have completely devoured its foliage. Rooks are particularly fond of them, when in their state of grubs; and hence the prejudice of farmers against these birds is ill-founded. In Ireland, the damage done by the beetle was at one time so great, in a particular district, that the inhabitants came to the resolution of setting fire to a wood of some extent, in order to prevent their propagation.

As these insects cannot support the heat of the mid-day sun, and therefore conceal themselves till evening under the leaves of trees, the most effectual way of destroying them is to beat them off with long poles, and then to collect and burn them: or, according to Dr. T. Molyneux, they are very beneficial for fattening poultry. Smoke is extremely offensive to them, consequently, the burning of heath, fern, or other weeds, will prevent their incursions in gardens, or expel them if they have entered. The leaves of the young turnip are supposed to be devoured by this fly, which Dr. Darwin conceives may be destroyed by rolling.

That very troublesome insect, the common black beetle, may be extirpated by placing a hedge-hog in the kitchen, during the summer nights.

A German writer recommends to place a bundle of pea-straw near their holes, as they are fond of creeping into it, and after a short time, it should be suddenly taken away, and burnt.

Another simple method, which is so well known, that it scarcely deserves to be mentioned, is, to place a vessel with any liquid, with pieces of board in an oblique direction, to facilitate their ascent to the edge of the vessel, over which they will fall into the liquid.

BEGGARS require no definition.

Various opinions have been held, concerning the good or bad consequences which result from the practice of relieving common beggars, in the public streets. Dr. Burn observes, "that this kind of charity, is setting up private judgment against public law. The legislature has provided for the poor in one way, but we think that is not so good, and therefore will have a way of our own—the worst and most abandoned of the people are sustained by the efforts of well-meant, but very ill-judged charity; there is one way," he says, "to put an end to begging, and the easiest in the world—*to give them nothing*. If none were to give, none would beg; and the whole mystery and craft would be at an end in a fortnight."—See Charity.

We cannot implicitly agree with the rigorous measures of Dr. Burn; for, though the legislature have provided for the poor, in many instances this provision is ineffectual; and it may often happen to be dispensed at too late a period, for the relief of the distressed object.

The generality of the poor in the metropolis, may be divided into two classes: first, those who are incapable of working; and, secondly, such as are able, but unwilling. The former may be considered as real objects of charity; but they ought not to be suffered to infest the streets, and expose their distorted limbs, or disgusting sores. The latter class, however, is most numerous; as it comprehends the most abandoned and profligate outcasts of society. Whatever is given to these miscreants, may be considered as applied to the rising fund of vice and immorality.—On the other hand, a due distinction ought to be made between those who have by misfortune been reduced to a state of indigence, and others, who are vagrants by profession. Rousseau justly remarks, that a great number of beggars may become burthensome to a state; that it is a duty incumbent on a wise administration, to make such regulations as will prevent beggars from annoying the industrious: yet we would reply to this benevolent philosopher, that the execution of such a plan has often been attempted, but has succeeded only in countries or cities comparatively small; for instance, in Geneva, Munich, Hamburgh, &c. and if credit be due to public report, in the Imperial city of Germany, which, in this respect, forms a remarkable exception.

Mr. Bleamire, in his "*Remarks on the Poor Laws,*" just published, pointedly observes, that "persons utterly unable to support themselves, were always proper objects for parochial relief; but the idle, lazy, and abandoned, who now, to the shame of our modern governors of parishes, crowd every poor-house, were, and still ought to be, objects of punishment. If those (he adds), who are entrusted with the care and management of the poor, would exercise an impartial and honest discrimination among the persons who apply to them for relief, poor-houses would be less frequented; the poor-rates considerably reduced; and, by turning those receptacles into work-houses, vicious idleness be checked, and virtuous industry greatly promoted."

It does not behove us to pronounce judgment on beggars; but, reflecting on the contagious tendency of *street-begging,* as an allurement to those whose moral principles are weak, or corrupted, we shall conclude in the words of a learned magistrate, who emphatically says, in one the latest critical journals, "that the enormous sums which have of late years been raised for the support of the Poor, are not only a national grievance, but a national *disgrace!*"—See farther, Poor-houses.

Belladonna. See Deadly Night-shade.

BELLES LETTRES, or polite literature, a very comprehensive expression, though not easily defined. Our industrious predecessors, the editors of the "*Encyclopædia Britannica,*" justly complain that they cannot find either a clear definition, or a succinct explanation, of the words *Belles Lettres,* nor any summary of those sciences which are comprehended under this general and collective denomination. With diffidence we venture to assert, that, to us, it does not appear a vague term; and though neither the voluminous French nor English Dictionaries contain an analysis of this expression, our difficulties, in this respect, are by no means insurmountable.

When we consider the influence or effect of polite literature on the moral and intellectual character of man, it may be defined to be that extensive ramification of the *subjective* sciences, which are peculiarly calculated to improve the heart, and enlarge the mind, in contradistinction to those *objective,* or physical sciences, which principally tend to increase the knowledge of the senses, while they explain the nature of external objects, and are therefore denominated *Natural* and *Experimental Philosophy,* including Natural History in all its branches. Of the latter, we shall treat in their proper places; and confine our analysis, at present, to the Belles Lettres. These useful and elegant acquirements distinguish the accomplished scholar from the illiterate mechanic, who studies and applies the effects of motion, form, variety, and action, while the former endeavours to account for their causes. It would be inconsistent with our plan, to accompany every department of polite literature with a separate definition; which would extend this article beyond its proper limits. Hence we shall content ourselves, with exhibiting merely an outline of the branches of this extensive tree of learning.

1. The Arts of Speech, comprehending Oratory and Poetry; which

last is again divided into epic, dramatic, lyric, &c.

2. Ornamental Gardening.

3. Elegant Architecture.

4. Music, vocal and instrumental.

5. The Gymnastic Arts, such as Dancing, Fencing, Riding, &c.

6. The Art of Drawing, which includes Painting, Engraving, Carving on Wood, Basso Relievo, and Mosaic Work.

7. The Art of Printing, the most simple, but the most extensively useful.

We cannot, on this occasion, differ in opinion from the Monthly Reviewer, who, in the 79th volume of that work, when analyzing the Transactions of the Royal Society of Edinburgh, makes the following judicious remarks: The French, beside many other similar institutions, have long had their Academy of Sciences, and also that of *Belles Lettres*. The gentlemen addicted to philosophical inquiries, knew the value of the former, and the Memoirs of the Academy of *Inscriptions and Belles Lettres* form a body of criticism and curious investigation, not equalled by any other polite nation in Europe. We have, indeed, in this country, the Royal Society, and the history of their *Philosophical Transactions*. Why polite literature has not been thought worthy of some public institution, no good reason can be assigned. The true cause, perhaps, is, that political ferments, party disputes, the violence of faction, and the interesting objects of trade, which naturally engross the thoughts of a great commercial country, may have contributed to make the poets, the historians, and the orators of antiquity, appear too frivolous, and unworthy of attention. Letters, it is true, have been cultivated in England, notwithstanding all discouragements; but it must be allowed, that they would have been cultivated to more advantage by a body of men assembled under the royal patronage. The want of such an institution has been always considered as a reproach to this country. Even in the present age, which, to its honour, has given encouragement to the Arts, and, indeed, has raised them to a degree of unrivalled perfection, the idea of such an academy has never been started, or, at least, never pursued with effect. It is reserved, it seems, for our fellow-subjects of the north, to take the lead in this important business.

BELL-FLOWER, or *Campanula*, L. a genus of plants comprehending eighty species: of which, however, only nine are indigenous. The following are the principal:

1. The *rotundifolia*, or Round-leaved Bell-flower, which grows on heaths, and the borders of fields; with long narrow lanceolated leaves on the stem, but heart or kidney-shaped, and sometimes oval leaves close to the ground; it produces blue or white flowers, in August and September. See WITHERING, 241; and CURTIS, *Lond. fasc.* 4. t. 21.—Cattle and Sheep browse upon these flowers with avidity; and they are likewise useful in dyeing. The milky juice of the white flowers is said to impart a beautiful green colour, by the addition of alum. The juice of the blue flowers alone has been used for painting and writing; and DAMBOURNEY asserts, that with these flowers he dyed wool and cloth of a fine *vigogne* colour, having previously immersed them in a properly diluted solution of bismuth.

2. The

2. The *rapunculus*, or Rampion Bell-flower, with straight stalks two feet high, undulated leaves, those next the root short, lance-shaped, and nearly oval: its small blue or white flowers, which appear on the upper part of the stem, blow in July and August. See WITHERING, 242; and *Engl. Bot.* t. 283.—Formerly the rampion was cultivated in gardens, for its roots, which were used in salads; and though much neglected, it is often met with in a wild state, on fallows, and beside causeways; especially near Croydon and Esher, in Surrey.

3. The *latifolia*, or Giant Bell-flower, with oval lance-shaped leaves, a very simple cylindrical stem, solitary flowers (in August), and pendent seed: it grows in thickets and under hedges. See WITH. 243, and *Engl. Bot.* t. 302. The roots of this species are likewise an useful addition to salads.

4. The *rapunculoides*, or Creeping Bell-flower, with heart and lance-shaped leaves, a branchy stalk, pendent flowers, and reflected flower-cups. It grows in thickets, blows in August, but is extremely scarce, though it has formerly been found in some woods among yew-trees, in Oxfordshire; and recently at Blair, in Scotland. The roots of this species are likewise esculent, and cattle are fond of its leaves.

5. The *glomerata*, or Clustered-Bell-flower, with angular stems, and sessile flowers terminating in a head. It grows on high calcareous lands, and blossoms in July and August. See WITH. 244, and *Engl. Bot.* t. 90. Although bees eagerly frequent the flowers of this species, yet it should be carefully extirpated from meadows and fields, as being a pernicious food for cattle.

Bellis. See DAISY,

BELLOWS, an apparatus so contrived, as alternately to inspire and expel the air. This machine is too well known to require a particular description. It is used in chambers, kitchens, forges, and founderies, as likewise for organs, and other pneumatic instruments, to introduce into them a proper volume of air.

ANACHARSIS, the Scythian, is recorded as the inventor of bellows. Their action bears an affinity to that of the lungs; for what is called blowing in the former, is an illustration of respiring in the latter. Animal life may, on some occasions, be supported by blowing into the lungs with a pair of bellows; especially in accidents of drowning or suffocation.

Hessian Bellows, a contrivance for supplying a mine with fresh air, for the respiration of the miners. This machine has been improved by M. PAPIN, who has changed its cylindrical into a spiral form.

BELLY-ACH, or Colic, is a disease which may arise from various causes, and is generally accompanied with costiveness, though sometimes also with diarrhœa, especially in children. Adults frequently become liable to attacks of this malady, in consequence of excess in eating, or after partaking of incongruous mixtures, or dishes, which may occasion a distension of the bowels.

The symptoms of this complaint, in infants, are, sudden cries, contraction of the thighs towards the belly, striking with the feet, distortions of the face, not unlike those in laughing, hastily seizing and relinquishing the maternal breasts, acid eructations, &c.—If the child be costive, it will be necessary to relieve the bowels with very small doses of manna and rhubarb, given in chamomile tea, every half hour, till they produce the desired effect: sometimes a small quantity of the powder of gum arabic is an useful addition. When green feces are discharged, a few drams of magnesia, with one or two of rhubarb, according to the age of the infant, may be given with advantage; but the greatest benefit will, on such occasions, be derived from a proper application of clysters, composed either of a decoction of chamomile, with a spoonful or two of sweet oil, and a few grains of salt; or milk, oil and sugar, or merely a solution of white soap and water; which last is the cheapest, and most efficacious. Cataplasms, or the common poultice, made of bread, milk, and oil, may likewise be applied to the lower part of the belly, and repeated as often as they grow cold; adding every time the necessary portion of new milk, to give them a proper consistence.—See Colic.

Belts, acroamatic. See Quackery.

Benefit of Clergy.—See Clergy.

BENE-SEED, the production of an American plant, the botanical name of which we have not been able to ascertain. According to a letter of Mr. J. Morel, inserted in the first volume of the "*Transactions of the American Philosophical Society*;" this seed yields an oil of an equal, and even preferable quality, to Florence oil: one hundred weight of seed will produce ninety pounds of oil; its cultivation, therefore, deserves to be strongly recommended.

BENT GRASS, or *Agrostis*, a genus of grasses comprehending forty-one species, of which, according to Dr. Smith, only eight are indigenous; though Dr. Hull enumerates fourteen: of these, however, we shall take notice of only two:

1. The *Spicaventi*, or Silky Bent-grass: it grows to the height of three or four feet, on dry sandy fields. See With. 126.—When young, it affords a tolerable fodder for cattle; but should not be given to them in its mature state, as its sharp leaves are apt to injure their gums. With a decoction of the brown flowers and stalks of this species, linen may be dyed of a pleasing yellow colour, merely by repeated dippings, without any farther addition, except a little alum, which gives it a greenish shade. The stalks are used by the Russians and Tartars, for manufacturing beautiful basket-work.

2. The *stolonifera*, Creeping Bent-grass, or Blue Squitch-grass, grows in moist fields and meadows; see With. 131.

It deserves to be cultivated, as it produces a wholesome and nourishing fodder for cattle; and, at the same time, suppresses the growth of mosses, and other weeds, by its quick and luxuriant vegetation.

BENZOINE, a concrete resinous juice, obtained, according to Mr. Dryander, from the *Styrax benzoë*, L. a tree which grows chiefly in the island of Sumatra. It is imported from the East Indies, in large masses composed of white and light brown pieces, or yellowish drops, which easily break between the fingers. This resin is extremely fragrant, especially when heated; and, in a cold state, it has a sweetish taste.

When exposed, in proper vessels, to the action of fire, benzoine yields a considerable proportion of a white saline concrete, called:

Flowers of Benzoine, or *Benzoic acid:* this chemical production is obtained in a cheap and easy way, invented by Mr. SCHEELE; his process is as follows: Take one dram of the salt of benzoine, and dissolve it gradually in three ounces of boiling water; then strain the liquor, while hot, into a glass vessel which has previously been heated; let it stand till the crystals are formed, and afterwards carefully decant the solution, and separate all the salt, by repeated gentle evaporations and crystallizations. As, on account of their extreme lightness, flowers of benzoine cannot be easily reduced to powder, it is advisable to preserve them in the form of a fine precipitate. When properly made, they have an agreeable taste and a fragrant smell. Spirit of wine dissolves them completely, as well as water by the assistance of heat. In order to keep them suspended in the latter medium, sugar must be added, and, in that state, they may be easily formed into a balsamic syrup. In diseases of the breast, from twenty to thirty grains were formerly administered, and held in great estimation as a pectoral and sudorific medicine; but they are at present seldom employed, except as an ingredient in the well-known paregoric elixir, and likewise in the camphorated tincture of opium.

As a perfume and cosmetic, the solution of flowers of benzoine still maintain their reputation at the *toilette*; though, we believe, that their efficacy is not superior to the crystals of lemon juice, or even the salt obtained from the ashes of bean-straw, and that their agreeable odour is the only superiority which they possess.

Animal Benzoine, or a Salt of similar properties to that obtained from the *Styrax benzoë,* L. has lately been discovered by the French chemists, in the urine of different animals, especially horses, from which it may be precipitated in a white powder, by adding only a small proportion of muriatic acid, or spirit of salt. But this *benzoic acid* has been found in still greater quantities in the urine of cows and horses, in which hay and straw had been soaked. Hence, near cow-houses and stables, where great numbers of cattle are fed, it may be easily manufactured in the large way, by combining this valuable acid with lime, and afterwards precipitating it by the marine acid, which will effectually remove the offensive smell.

Probably the urine of all herbaceous animals contains the benzoic acid in abundance; as it appears to be chiefly derived from the sweet-scented spring grass, or *Anthoxanthum odoratum,* L. This fragrant substance has likewise been discovered in the urine of infants, by M. SCHEELE: he, however, observes, that he could precipitate it in considerable quantities, only during that stage of infancy when there existed no phosphoric acid, or similar salt in the urine; or, in other words, while the phosphoric ingredients were employed by Nature in the formation of bones. This remarkable phenomenon also proves, that the benzoic acid is actually *generated* in the animal economy; because the first nourishment of infants, the mother's milk, does not appear to contain it. Hence the French chemists have endeavoured to explain the cause of the rapid formation of bones during early infancy;

because the phosphoric acid of the urine of infants, and the phosphat of lime contained in milk, both being deposited in a solid form, contribute to the consolidation of the animal frame: and these two substances have, by chemical analysis, been found to serve as the basis of bones.

BERBERRIES, or Barberries, the *Berberis*, L. a shrub better known by the name of *Piperidge bush*. There are three species of this plant, but one only is indigenous, namely, the *vulgaris*, or Common Berberry, which grows spontaneously in hedges in many parts of England and Scotland, and is frequently cultivated in gardens for its fruit, which makes a good pickle, and is used for garnishing dishes. It rises to the height of eight or ten feet, with many stalks, which have externally a white bark, but yellow on the inside: the stalks and branches are thorny; the leaves are oval, and obtuse, with slightly serated edges; the blossoms grow at the wings of the leaves, in small bunches, like those of the currant bush: these are succeeded by oval fruit, which are at first green, but when ripe turn to a fine red colour. The flowers appear in May and June; and the fruit ripens in September.—See WITH. 350, and *Engl. Bot.* 49.

There are three varieties of this shrub, viz. the berberry, which bears a fruit without stones; the berberry with white fruit; and the eastern berberry, or that which produces a black and sweet fruit.

The first sort is generally propagated by suckers, but the method of planting by layers is preferable. The best time for laying down the branches, is in autumn; and the young shoots of the same year are most proper for this purpose. When this shrub is cultivated for its fruit, it should be planted singly, and not in hedges, as was formerly the practice; the suckers should be cut up every autumn, and the luxuriant shoots pruned; by this means the fruit will be more abundant, and of a better quality than that which grows wild. The third species should be planted in pots, and sheltered as soon as the young shoots are taken off, till the plants have acquired strength, when they may be removed to a warmer situation.

Berberries, on account of their astringent properties, have occasionally been prescribed in bilious diarrhœas. The Egyptians used them in fluxes and malignant fevers, for abating heat, invigorating the body, and preventing putrefaction. For this purpose the fruit, according to Dr. LEWIS, should be macerated for twenty-four hours, in twelve times its weight of water, with the addition of a little fennel-seed; the liquor, when strained, should be sweetened with sugar, or syrup of lemons, and given liberally as a drink. The flowers, when near, are offensive to the smell, but at a distance their odour is extremely fragrant. An infusion of the bark in white wine, is purgative. In distillation, the berries, when previously bruised, have been mixed with the grain to increase the quantity of spirituous liquors. The roots, boiled in ley, impart a yellow colour to wool; and in Poland, leather is tanned of a most beautiful yellow with the bark of the root. The inner bark also, with the addition of alum, has been employed for dyeing linen of a similar colour.

The effect of this shrub upon wheat lands is truly singular; and though well known to botanists, is not familiar to every farmer. When growing in the hedges near corn-fields, it changes the ears to a dark brown colour, and prevents them from filling; nay, its influence in this respect has often extended across a field to the distance of three or four hundred yards: it should, therefore, be carefully eradicated from lands appropriated to tillage. It is eaten by cows, sheep, and goats, but rejected by swine.

BERE, or *Barley-big*, or *Square Barley*, is a very strong luxuriant plant, both in grain and straw: it resembles barley in growth, and cone-wheat in size. It is generally cultivated in Ireland, for malt, in the best and richest soil, usually after potatoes: the time of sowing is between Michaelmas and Christmas, at the rate of one barrel, which is two hundred weight, to an Irish acre; and its produce is said to be, generally, from twenty to twenty-five barrels an acre. Two bushels and a half of seed to an English acre, will be in the same proportion. For the information of those readers who are not acquainted with the difference in the measurement of land, we shall observe, that five Irish are equal to eight English acres and fifteen perches, or 70,560 feet to an Irish, and 43,560 feet to an English, acre.

The culture of bere is recommended in this country—1. Because it will succeed extremely well in any soil fit to produce a crop of barley, and even on cold stiff lands, where barley will not thrive: 2. As it ripens from one to three weeks sooner than any other grain: 3. It may, if generally cultivated, be introduced into our malt-distilleries, not only instead of barley, but, what is of much greater importance, as a substitute for wheat, of which so much is used in these manufactories: and, lastly, it may, with great advantage, be given to swine, instead of barley-meal. Moreover, it has been asserted, that an acre of land will yield more of this grain than of barley.

Bere labours under the disadvantage of not being easily cleared of its anns, or beard. This has been imputed to carelessness in cleansing, or preserving it from moisture in the stacks; but the difficulty is more probably owing to the grain being cut down before it is thoroughly ripe.—If sown earlier than usual, it is still more productive.

A correspondent, in a letter to the editors of the "*Museum Rusticum*," &c. mentions a curious circumstance respecting the cultivation of this grain: "Amongst some wheat," says he, "that was sown last year, a small quantity of bere happened to be mixed; all of which bere is now in the ear, and in the most flourishing condition I ever beheld: even the long-continued easterly wind has not in the least affected it; and we may expect it to be ripe very soon. I could earnestly desire some of your readers to try this experiment, and shall endeavour to have it done myself. There are many of your readers who would be glad that this grain had a better character, as to its cleanliness; and I am persuaded it would come into great esteem every where."

BERGAMOT, a variety of the citron, produced by grafting the latter on the stock of a bergamot-pear-tree. The fruit has an exquisite smell and flavour; and its essence is highly esteemed as a perfume. It is extracted from the rind of the fruit, by cutting it into small pieces, and expressing the oil into a glass vessel. A fragrant water is distilled from the peel, as follows: Take the rind of three bergamot-pears, one gallon of pure spirit, and four pints of water; draw off a gallon in a *balneum maris*, or water-bath, and add a sufficient quantity of refined white sugar: or, take of the essence of bergamot three drams and a half, spirit of wine three pints, and of volatile sal ammoniac one dram; distil off three pints in a similar manner.

BERNE-MACHINE, an engine for rooting up trees, invented by P. SOMMER, a native of Berne, in Switzerland.

This machine consists of three principal parts: the beam, the ram, and the lever. The beam is composed of two planks of oak, three inches thick, and separated by two transverse pieces of the same wood, of an equal thickness. These planks are perforated with holes to receive iron pins, upon which the lever acts between the two sides of the beam, and is shifted higher as the tree is raised out of its place. The sides are secured at the top and bottom by strong iron hoops. The pins should be an inch and a quarter, and the holes through which they pass, an inch and a half in diameter. When the machine is in action, the bottom of the beam is secured by stakes driven into the earth. The ram, which is made of oak, elm, or some other strong wood, is capped with three strong iron spikes, which take fast hold of the tree. This ram is six or eight inches square; and an incision is made longitudinally through its middle, from the lower end to the first ferule, in order to allow room for the chain to play round the pulley, which should be four inches thick, and nine inches in diameter. The ram is raised by means of the chain, which should be about ten feet long, with links four inches and three quarters in length, and one inch thick. One end of this chain is fastened to the top of the beam, while the other, after having passed through the lower part of the ram, and over the pulley, terminates in a ring or link, the two ears of which serve to keep it in a true position between the two planks of the beam. The hook, which should be made of very tough iron, is inserted in this ring; and the handle ought to be two inches thick where it joins to the hook, and gradually lessen in thickness up to the arch, which should be about half an inch in diameter. On each side of the upper pin is a semi-circular notch, which rests alternately on the pins, when the machine is worked. The hole and arch serve to fix a long lever of wood, by means of two iron pins, and thus it is raised or lowered at pleasure, in order to render the working of the machine easy, in whatever part of the beam it may be placed; for, without this contrivance, the extremity of the lever would, when the handle is near the top of the beam, be higher than men standing upon the ground could reach.

This machine is worked in the following manner: it is placed against a tree, and the end of the beam supported by stakes. The iron handle is placed in the opening between the two planks of the beam, and the wooden lever fixed to it, by means of the iron pins. The hook takes hold of the chain, and one of the iron pins is thrust into the outer row of holes, by which means the exterior notch will rest on the pin, which will be the centre of motion; and the end of the lever being pressed downwards, the other notch will be raised, at the same time the chain, and consequently the ram. Afterwards, the other iron pin is to be put into the hole in the inner row, above that which was before the centre of motion, and the end of the lever elevated or pushed upwards, the latter pin on which the notch rests then becoming the centre of motion. By this alternate motion of the lever, and shifting the pins, the chain is drawn upwards over the pulley, and consequently the whole force of the engine exerted against the tree. There is a small wheel joined to the end of the ram opposite the pulley, in order to lessen the friction of that part of the machine.

From this account, the reader will perceive that the machine is a single pulley, compounded with a lever of the first and second order. As the push of the engine is given in an oblique direction, it will exert a greater or less force against the horizontal roots of the tree, in proportion to the angle formed by the machine with the plane of the horizon; and the angle of 45° is the maximum, or that when the machine will exert its greatest force against the horizontal roots of the tree.

Bethlehem. See Star of Bethlehem.

BETONY (Wood), or *Betónica officinalis*, L. a low perennial plant, growing wild in woods and thickets; its flowers, which appear in July and August, are of a purplish colour, and stand in spikes on the tops of the stalks. — See With. 530; and Curt. *Lond. fasc.* 3. t. 33.

Tanners have employed this plant as a substitute for oak-bark; and, according to Dambourney, the leaves and branches of the betony, when in blossom, may be used for dyeing wool of a permanent dark-brown colour, when previously dressed in a weak solution of bismuth.

The leaves and flowers have a bitterish taste, accompanied with a weak aromatic flavour. They are mild corroborants; and, when infused, or gently boiled, the decoction may be drank as tea: a strong tincture made in rectified spirit, has proved beneficial in laxity and debility, when taken in small, repeated doses.

It is remarkable, that the roots of this plant greatly differ in quality from the other parts: the former are bitter, nauseous, and, like the roots of hellebore, occasion violent diarrhœa, when taken in a small dose. It is farther affirmed, that betony affects those who gather any quantity of its leaves and flowers, with a disorder resembling the effects of intoxication.

Betula. See Birch.

BEZOAR, in natural history and medicine, is a calculous concretion, found in the stomach of animals of the goat kind. It is a morbid substance, possessing neither taste nor smell, and it cannot be considered in any other light than as a weak absorbent. In a more comprehensive sense, bezoar includes all concrete substances formed in the intestines of animals: hence pearls, and the concretions called crab's eyes, belong to the class of bezoars.

Fossil Bezoar, is a kind of stone formed like the animal bezoar of several coats round some extraneous body. It is found in Sicily, in sand and clay-pits.

Bidens. See MARYGOLD.

BIENNIAL PLANTS are those of only two years duration. Several vegetables are of this tribe: being raised from seed, they generally attain perfection the first year; and in the following spring, or summer, they produce their flowers and seeds, and soon afterwards decay.

Biennials consist of esculents, and flower-plants. The former include the cabbage, savoy, carrot, parsnip, beet, onion, leek, &c.; and the latter, the Canterbury bell, French honey-suckle, wall-flower, stock July-flower, Sweet-William, China-pink, common-pink, carnation, scabious, holly-hock, tree-mallow, vervain-mallow, tree-primrose, honesty, or moonwort, &c.; all of which, if sown in March, April, or May, rise the same year, and in the following, shoot up into stalks, flower, and produce perfect seeds in autumn. Though most of the biennials dwindle in the third year, a few of them, particularly holly-hocks, wall-flowers, carnations, and pinks, produce flowers which, however, are generally small, and of faint colours. Hence it is necessary to raise an annual supply from seed; though the three last mentioned plants may be propagated by slips and layers.

BILBERRY, or the *Vaccinium*, L. is a plant of which, according to BECHSTEIN, there are twenty-six species, while others enumerate only fifteen: of these, the following are indigenous:

1. The *myrtillus*, or Bilberry, which grows in abundance, in woods and heaths. See WITHERING, 370, and *Engl. Bot.* 456. The berries, when ripe, are of a dark-blue colour; and, on account of their astringent quality, are occasionally given in diarrhœas, with good effect. In Scotland, they are eaten by the Highlanders, in milk; and likewise used in tarts and jellies: they produce a violet-coloured dye, which requires to be fixed with alum. The juice, mixed with a fourth part of lime, verdigrise, and sal ammoniac, affords a purple pigment used by artists. The young tender leaves of this plant, properly dried, are an excellent substitute for tea.

2. The *uliginosum*, or Great Bilberry, is found on marshy heaths. See WITHERING, 370, and *Engl. Bot.* 581.—The fruit of this species is not so much esteemed as that of the preceding, because, if eaten in any quantity, it is apt to occasion head-ach.

3. The *Vitis Idæa*, or Red Whortle Berry, which grows on heaths, and in woods. See WITHERING, 371, and *Engl. Bot.* 593. Its fruit is acid, and cooling. In Sweden, it is eaten in the form of a jelly. The young leaves of this species might also be advantageously used instead of tea; from which they can scarcely be distinguished.

4. The *Oxycoccus*, or Cranberry, is common in bogs covered with mosses. It grows abundantly in the north of England, likewise on Dersingham moor, in Norfolk, and in Scotland and Ireland. See WITH. 372, and *Engl. Bot.* 319.

Great quantities of these berries are used in confectionary, as delicious ingredients in tarts; to which they impart a rich flavour. A considerable traffic is carried on with cranberries, in the northern counties; insomuch, that at Longtown, in Cumberland, alone, the amount of a market-day's sale, is said to be from 20 to 30l. It deserves to be added, that this fruit may be kept in a fresh state for many years, merely by immersing it in a bottle filled with spring water, and closely stopped. Silver, boiled in a decoction of the berries, acquires a whiter and more beautiful lustre.

All the species of the bilberry are antiseptic; and their juices, mixed with sugar, and properly fermented, may be converted into grateful and wholesome domestic wines.

BILE, is a yellow, or greenish, saponaceous liquor, secreted in the liver, and collected in the gall-bladder, into which it regurgitates, as it were, into a blind gut, and is thence discharged into the lower end of the *duodenum*, or beginning of the *jejunum*. (See Abdomen). Its principal use appears to be that of sheathing or blunting the acids contained in our daily food, and thus enabling the milky liquor, called chyle, after being mixed with bile in the duodenum, to enter the lacteal veins, or milk vessels, which convey a nutritious supply to the whole body. (See Lacteals). Hence an increased quantity of aliment requires a greater proportion of bile, to promote its digestion; and, accordingly as the stomach is more or less distended with food, it presses on the gall-bladder to obtain a proportionate quantity of bile, which is then mixed with the chyle, as before described.—See Chyle, and Liver.

Bile is a very important fluid in the animal economy, insomuch, that from an excessive secretion of it, the inhabitants of warm climates become liable to many tedious and often fatal diseases. A superabundance of bile in the first passages, either flows again into the stomach, and is productive of general languor, nausea, a foul tongue, loss of appetite, and indigestion; or, when it is determined to the intestines, it is generally attended with a painful diarrhœa. In the temperate climates, however, a vitiated and superfluous bile is more frequently diffused through the whole body. In this case, the skin assumes a yellow colour, the urine becomes sensibly impregnated with bilious matter, the pulse is preternaturally quick, and the patient complains of heat, thirst, head-ach, and other symptoms of fever. His body becomes gradually emaciated, and his visage strongly indicates the disorder of the constitution.—Various are the causes of this extensive derangement of the different bodily functions; but we may safely assert, that most persons, particularly in *hot* climates, contract bilious diarrhœas, colics, fevers, and chronic diseases of the liver, by intemperance in eating animal food, drinking spirituous liquors, and by braving the sudden transitions of temperature, from the intense heat of day to the piercing chilness of night, and thus checking insensible perspiration—one of the most necessary excretions of the human body. For the cure of such maladies as may arise from numerous and diversified causes, no general plan can be safely prescribed. But it deserves to be remarked, that the greatest benefit may be derived from adopting a proper diet and regimen; both with a view to prevent and relieve bilious diseases. Hence we would advise persons liable to eructations, flatulency, and costiveness, which arise from a vitiated bile, to abstain from all acrid, watery, and oily food, especially butter and fat meat; to abandon hot liquors, such as tea, coffee, punch, &c. to regulate the depressing passions of grief, anger, and anxiety; to exchange a hasty and irascible for a more placid and composed temper; and on the whole to pursue a calm, steady, and temperate course of life.

Vitiated Bile, is a common disease in infants, who are suckled by intemperate or passionate nurses; or, in consequence of their being fed with improper nutriment, such as viscid pap made of flour, instead of biscuit or well baked bread; animal food, before they are twelve months old; gingerbread and pastry. This complaint manifests itself by green stools, and an acrid quality of the bile, which even excoriates the flesh: the child expresses its pain by incessant crying, and drawing up of the legs. Nature, therefore, frequently removes the evil by copious evacuations, which are spontaneously excited by the acrimonious state of the humours. Hence the impropriety of administering chalk clysters combined with laudanum, or other cordials, and thus in a manner locking up the poison within the intestines; while the infant becomes most effectually intoxicated. Thence arise convulsions, enlargement of the mesentery, a principal, though remote, cause of consumption; the scald head; and scrophula in all its forms.—Instead of following those dangerous practices, which are calculated only to aggravate the complaint, two circumstances ought to be attended to, namely. 1. To remove the stimulating matter, by repeated small doses of tamarinds, combined with a solution of manna; and 2. To counteract the preternatural weakness and irritability of the intestinal canal, by the addition of gum arabic, powder of saleproot, or a little jelly made of Iceland moss. In cases, however, where considerable acidity prevails, it will be advisable to give a few grains of magnesia, in intermediate doses: but, if the spasmodic strictures of the abdomen continue, a medical practitioner should be consulted, whether it be proper to have recourse to a few drops of laudanum, or paregoric elixir, remedies which ought never to be intrusted to dabblers in medicine.

BILL, in husbandry and mechanics, an edged tool, made of iron, with a curvated point. It is much used by gardeners, for pruning trees, and by plumbers and basket-makers. When fitted to a short handle, it is called a hand-bill; when to a long one, a hedge-bill.

Bill, in law, a declaration in writing, either of some injury which the plaintiff has suffered from the defendant, or an offence committed by the person complained of, against some law or statute of the realm.

Bill, in commerce, a security for the payment of money given under the hand of the debtor, by which he is bound to pay the sum specified either on demand, or at some future day, according to the agreement of the parties.

In case of failure, the payment may be legally enforced. These bills must be written on stamped paper: if under 30l. the duty is 8d.; if above 30l. and not exceeding 50l. it is 1s.; above 50l. and not exceeding 100l. the duty is 1s. 4d.; and above 100l. and not exceeding 200l. it is 2s.

Bank-Bill, is an obligation signed on behalf of a company of bankers, by one of their cashiers, for value received, and payable on demand.

Bill of Exchange, a security among merchants in different countries, for the more easy remittance of money from the one to the other. This mode of facilitating payment in commerce, is now extended to almost every kind of pecuniary transactions.

Bill of Lading, an acknowledgment signed by the master of a ship, and given to a merchant. It contains an account of the goods received on board by the former from the latter, with a promise to deliver them at a certain place, for a specified sum.

Bills of Mortality, are accounts of the number of births and burials in a certain district, during a week, month, quarter of a year, or a whole year. The London Bills of Mortality are composed by the company of parish-clerks, and express the number of each sex; specifying also the various diseases of which they died.

Bill of Sale, is an instrument by which a person who delivers goods as a security to the lender of a sum of money, empowers him to sell them, if the sum borrowed be not repaid at the appointed time.

BINDWEED, or *Convolvulus*, L. a genus of plants, comprising forty-three species, of which only three are natives, namely:

1. The *arvensis*, or Small Bindweed, a common plant in fields and hedges, but particularly troublesome in gardens of a gravelly soil; its white and red flowers appear in June and July. See With. 239, and *Engl. Bot.* 312.—As the roots of this plant, particularly in wet seasons, strike deep into the ground, and injure the growth of corn, they ought to be carefully extirpated, and transplanted on the sandy banks of rivers and lakes, where they greatly tend to bind the soil. Bees are uncommonly partial to the flowers of the convolvulus; and it is eagerly eaten by black cattle, and sheep.

2. The *sepium*, or Great Bindweed, likewise a pernicious plant in gardens; it thrives under moist hedges; its stalk grows to the height of several feet, and bears white or purplish blossoms in July and August. See With. 240, and *Engl. Bot.* 313. The root of this species is very acrid and purgative to the human constitution; but does not affect swine, though eaten in large quantities. Its flowers are frequented by bees.

3. The *soldanella*, or Sea Bindweed, grows on the sandy shores of the sea, but cannot be long preserved in gardens; its purple flowers blow in July. See With. 240, and *Engl. Bot.* 314.—This species is also possessed of cathartic properties, so that half an ounce of the juice of the root, or one dram of the powder, is a strong dose. The leaves of the Sea Bindweed have often been externally applied for the reduction of dropsical swellings of the legs; and, it is asserted, with good effect.

Among the *exotic* species of this plant, we shall only mention the *Convolvulus Jalappa*, or Jalap, a native of Spanish America, which affords the drastic medicine of that name; the *Batatas*, or Spanish Potatoes, a delicious root imported from Portugal and Spain, but too delicate to thrive in the open air of our climate; the *scoparius*, or Bushy Bindweed, which grows wild in the island of Barrancas, and affords, it is said, the fragrant oil and wood of Rhodium; and, lastly, the *Scammonia*, or Syrian Bindweed, from the inspissated juice of which is prepared the efficacious purgative substance known by the name SCAMMONY.

BINDWEED, Black: See Climbing BUCKWHEAT.

BIOGRAPHY, an account of the lives and characters of remarkable persons. It is the most entertaining and instructive branch of history, and admits of the description and passion of romance, with this essential difference, that the characters and incidents ought not only to be agreeable to Nature, but strictly true. Hence no books are so proper for the amusement and instruction of youth, who, by reading them, are incited to the imitation of great and virtuous actions; while they are deterred from vice, by an animated delineation of its baneful effects.

As the subjects of biography are the lives of either public or private persons, many useful observations may be made from authentic accounts of those who have been eminently beneficial to society. Nay, even the lives of immoral characters may serve as a warning to deter others, and especially youth, from listening to the temptations of folly and vice.

Philanthropists, who have exposed their lives, or employed their faculties in the service of their fellow-creatures, deserve that their memory should be perpetuated, both as a tribute of public gratitude, and as virtuous examples in the annals of history. The love of fame is natural to the human mind; and, when properly directed, is at once productive of happiness to the individual, and general benefit to mankind.

In the lives of great men, their public characters are principally to be regarded; but, as the world is inquisitive, the investigation of their private conduct may also occasionally be useful, to illustrate the influence of example. On the other hand, too minute an inquiry into the foibles and infirmities of eminent men, is an illiberal and censurable curiosity. Among the ancient biographers, PLUTARCH is generally allowed to excel. On the relative merits of the moderns, we shall not venture to pronounce; as this would be an invidious and unpleasing task.

BIRCH-TREE (Common), or *Betula alba*, L. is one of the indigenous trees which has already been mentioned under the head of "ALDER-TREE," though the latter is only a species of the same genus, and ought more properly to have been denominated *Betula alnus*, L.

The white, or common birch-tree, is not of a large growth, but when cultivated in a favourable soil, and a good situation, it rises to a considerable height. There is a degree of elegance in its general appearance in summer, and the bark in winter is frequently variegated with red and white. It is easily cultivated by the usual method; but, when raised from seed, the young shoots of the birch should remain two years in the seminary, and then be transplanted in rows. They may also be propagated by layers: for this purpose, a sufficient number of plants should be placed at a distance of three yards from each other, in a soil which has been twice turned by the spade. If, in the following year, they should produce no shoots, they may be lopped to within half a foot of the ground, to form the stools, in consequence of which they will germinate with vigour in the following summer. In autumn, the young shoots should be plashed near the stools, and the tender twigs layered near the ends. Thus managed, they will have taken root, and become fine plants, the following autumn.

The wood of the birch is of very extensive use, as we have before stated under the article ALDER. Prof. PALLAS informs us, that the Tartars cover their huts with its bark, and the navigators of the Volga construct of it portable boats, cradles, &c.; it is also used in fumigations, to purify a vitiated atmosphere. The Laplanders cut the outer bark into thongs, of which they manufacture ropes, baskets, and other utensils; and it even forms some part of their wearing apparel: it is also used in dyeing; and, as a substitute for oak-bark, in tanning. The Swedish house-wives employ this bark, after burning it to a certain degree, as a cement for broken china, or earthen-ware. When boiled with alum, it affords a dye of a dark-red colour. DAMBOURNEY asserts, that the bark is better for tanning, when dried, than in a fresh state. For this purpose, it is cut into small pieces, and boiled for half an hour in pure water; and the prepared hides are steeped in it, while lukewarm. The ley is again boiled on the two following days, and the steeping of the leather as often repeated; after which it is suspended to dry in the air. Leather thus prepared, is said to be water-proof.

The leaves of the birch give a yellowish colour to wool, which has been previously prepared with alum. Those collected in the spring, however, are not so proper for dyeing, as the autumnal leaves; because the former produce a greenish tinge; but the latter afford a beautiful yellow colour. They have also been used in the dropsy, itch, &c. either applied externally, or in decoctions taken by the mouth.

The fungus which grows on the trunk of the birch-tree, is a very good styptic; and when boiled in water, beaten, and dried in an oven, it makes excellent touch-wood.

Birch-twigs are used for fishing rods and brooms; as well as by bird-catchers, who smear them with bird-lime.

Birch-Wine was formerly in considerable repute, as a remedy for nephritic disorders, but is disused in modern practice. As it is a rich cordial, and, according to Dr. NEEDHAM, an excellent remedy for consumption, and the scurvy, we shall acquaint our readers with the method of preparing it; though we have no experience of its medicinal powers.

The juice or sap of the birch-tree, should be extracted about the beginning of March, when the buds begin to swell, and before they have opened their leaves. An incision, or hole must be made in the trunk, almost as deep as the pith, under some branch of a well-spreading tree, on its south-western side, and about one foot above the ground: a hollow tube should then be fitted to the aperture, through which the sap will flow similar to distillation. On applying a little mould to the orifice, the wound will heal, and the bark afterwards close. Some persons are of opinion, that the sap drawn from the trunk of the tree, is not so pure as that obtained from its higher branches. To prevent this juice from fermenting, till a sufficient quantity is procured, the bottles in which it is collected, ought to be immediately stopped.

One of the best methods of making birch-wine is as follows: to every gallon of the sap, add a pint of honey, or a pound of sugar, stir the whole together, and boil it for an hour with a few cloves, and a little lemon peel; at the same time carefully scum the rising impurities. When cool, a few spoonfuls of new ale should be added, to induce a proper degree of fermentation; and, after the yeast has settled, the wine should be bottled up, and kept for use. If this liquor be prepared with proper attention, it becomes so strong that the common stone bottles, into which it is decanted, frequently burst.

Birch-Tree (Dwarf), or, *Betula nana*, L. an indigenous, creeping plant, which grows on moist heaths, and rarely exceeds three feet in height. It has roundish leaves, tender branches, a smooth bark, and its flower-catkins are uncommonly small: this diminutive tree, however, is more common in the marshy parts of Russia, Sweden, and on the mountains of Lapland and Norway, than in Britain. From its fibrous roots, the Norwegians and Laplanders manufacture very beautiful carpets; and its leaves are said to produce a more delicate yellow colour, than those of the common birch.

BIRD is a biped animal, provided with a bill, and covered with feathers, having two wings, by which it is enabled to fly, except in a few instances. The science which treats of birds, in general, is called *Ornithology*: to which article we refer the reader, for farther particulars respecting the feathered tribe. But the uses, &c. of the various species, will be stated under their different heads.

Bird-Call is a stick split at one end, and containing a leaf of some plant, by which the notes of different birds are imitated, and they are thus attracted to the net, snare, or lime-twig. Thus, a laurel-leaf fitted to the bird-call, enables a skilful whistler to produce accents resembling those of lapwings; a leek, those of nightingales, &c.

Bird-Catching is the art of taking birds, whether for the table, for the pleasure of their song, or with a view to destroy them, on account of their depredations.— This art is practised by several persons in the vicinity of London, for a livelihood; and is now reduced to a degree of systematic perfection. It is, however, attended with considerable expence, and the whole process is little known in other parts of Britain. We shall, therefore, as concisely as possible, describe the ingenious contrivances of bird-catchers, chiefly for the information and amusement of our country readers.

The nets are a most curious invention, about twelve yards and a half in length, and two and a half wide: the birds are caught by the nets flapping over each other.

Wild birds *fly*, as the bird-catchers term it, chiefly during September, October, and November; and also in March, though not in such abundance. The pippet, a small species of lark, appears about Michaelmas, and is succeeded by the wood-lark, linnet, gold-finch, chaff-finch, &c. none of which can be caught in great numbers at any other time. The birds are, generally, on the wing from day-break till noon; and, as they always fly against the wind, there is great contention among the bird-catchers, to obtain the best situation; for example, if the wind be westerly, the person who arranges his nets farthest to the east, uniformly has the greatest success.

The bird-catcher is generally provided with five or six linnets, two gold-finches, two green-finches, one wood-lark, a red-pole, yellow-hammer, and, perhaps, a bull-finch: these are placed at short distances from the nets, in small cages: he has, besides, what are called *flur birds*, which are fastened to a moveable perch, placed within the net, where they can be raised at pleasure, and gently lowered when the wild bird approaches.

As there is known to be a superiority between different birds of the same species, with respect to their song, bird-catchers always contrive, that their call-birds may moult before the usual time. This is effected by putting them into a close box for a month, under two or three folds of blankets, and leaving their dung in the cage, to increase the heat. In consequence of premature moulting, the captive bird not only begins to sing at a time when the wild ones are out of song, but his notes likewise are louder and more shrill than theirs.

Having arranged his nets, the bird-catcher disposes the call-birds at proper intervals; as their sight and hearing is infinitely superior to his own. As soon as the wild birds are perceived, notice is given by one of the call-birds to the rest they invite the wild ones by what is called *short jerks*: this invitation is so strong, that the latter are stopped in their course, and, it frequently happens, that, if half a flock only are caught, the remainder will immediately afterwards alight in the nets.

Nightingales are not birds of flight: like the wren, and other singing birds, they only move from hedge to hedge; and are caught by a trap-net, somewhat larger than a cabbage-net, and the bottom of which is surrounded by an iron ring; the trap is baited with a meal-worm.

The common way of taking larks is by nets, called *trammels*, which are thirty-six yards long, and six yards broad; they have six ribs of packthread, which are fastened to poles at the ends, about sixteen feet in length. A net thus prepared, is in the night drawn by five or six men over the ground, which it is made to touch at short intervals. When the birds fly up against the net, it is let down, and all under it are taken; such as woodcocks, snipes, partridges, quails, &c. Larks in the day-time are caught in clap-nets, fourteen or fifteen yards long, and two and a half wide. They are enticed by a decoy-lark, and likewise by small fragments of looking-glass fixed in a piece of wood, and placed in the middle of the net, so as to receive a quick and circular motion, by means of a string. This net, however, is employed only till the second week in November, as larks do not sport in the air, except in fine weather. But in gloomy days, the larker changes his engine, and makes use of a trammel-net, about twenty-seven feet long, and five broad; which is fixed on two poles eighteen feet long; and carried by men who, when passing over the fields, and perceiving a lark hit the net, drop it, and thus secure the bird.

We shall pass over the singular and hazardous methods of bird-catching practised by the inhabitants of the Orkney Islands, and in other parts of the world. But the following manner of taking birds alive, by means of a *fusee* or *musket*, is so ingenious, that we shall communicate it to our readers. It was invented by M. de VAILLANT, during his travels in Africa: if his plan be practicable, it will certainly facilitate the researches of the Ornithologist.—Put a smaller or larger quantity of gunpowder into the musket, according as circumstances may require. Immediately above it, place the end of a candle of sufficient thickness, ramming it well down; and then fill the barrel with water up to the mouth. When at a proper distance, fire the musket thus loaded at a bird, which will only be stunned, by watering and moistening its feathers, and may be easily laid hold of, before it has time, by fluttering, to injure its plumage.

BIRD-LIME is a viscid matter used for catching birds.—There are different ways of preparing this substance, but it is generally made of holly bark, which is boiled ten or twelve hours; and when its green rind is separated, it is covered up in a moist place, to stand for a fortnight. It is afterwards reduced to a tough paste, and washed in a running stream, till no impurities appear. Next, it is suffered to ferment for four or five days, during which it must be frequently skimmed. Afterwards it is mixed over the fire, with a third part of nut-oil, or thin grease, and thus rendered fit for use.

Dr. DARWIN observes, that this resinous material possesses uncommon adhesiveness to feathers, and other dry, porous bodies; whence it has obtained the name of *bird-lime*. It much resembles the *caoutchouc*, or elastic resin, imported from South America; and is also similar to a fossil elastic bitumen found near Matlock, in Derbyshire; both in its elasticity and inflammability. He farther suggests, that holly may be worth cultivating, both for its wood, and the quantity it contains of this elastic matter. On this occasion, the Doctor mentions a remarkable fact, deserving the attention of rural economists. About thirty years ago, a person who purchased a wood in Yorkshire, sold the bird-lime prepared from the bark of the numerous holly-trees, to a Dutch merchant, for nearly the whole sum given for the wood. If, therefore, this substance could be hardened, it might probably be substituted for the caoutchouc, or India-rubber.

The German method of preparing bird-lime is, by putting about two pounds of lintseed oil into a pot, to simmer upon the fire for some time, after which it is taken off, and lighted with a match. In this state of inflammation, it continues about two hours, when half the quantity will be consumed. By dipping, from time to time, a stick into the oil, and trying the matter between the fingers, its proper glutinous consistence may be easily ascertained; on which the pot is covered, and the flame extinguished.

Water bird-lime may be prepared as follows: Take a pound of strong and good ordinary bird-lime, wash it thoroughly in spring-water, till it become perfectly soft; next beat it well, that the water may be entirely separated; then dry it, put it into an earthen pipkin, and add to it as much capon's or goose-grease as will render it fluid. In this state of the preparation, add two spoonfuls of strong vinegar, one spoonful of oil, and a small quantity of Venice turpentine. Let the whole boil for a few minutes over a moderate fire, stirring it during that process. Then take it off; but, previous to its use, warm it, and cover the twigs with it in every direction. This is the best bird-lime for snipes, or such birds as frequent marshy places.

The proper method of using bird-lime is, to cut down the principal branch of a tree, the twigs of which are straight, long, and smooth. The willow and birch are the best for this purpose. After the superfluous shoots have been lopped, and the twigs cleaned, they must be uniformly covered with the bird-lime, to within four inches of the bottom; but the main stem should not be touched by this matter. Great care is required in laying it on properly; for, if too thick, it will alarm the birds, and prevent their approach; and, if too small a quantity be applied, it will not hold them when they settle upon it. The branch thus prepared, must be erected in a hedge, or among some growing bushes. If employed in summer, it should be placed in a quickset hedge, in groves, bushes, or white-thorn trees, near corn-fields, &c.; but in winter, the best spots are near stacks of corn, sheds, or barns. The sportsman ought to stand as near the limed bush as possible, and imitate the notes of birds with a call. When a bird is attracted to the bush, and entangled by the lime, the sportsman should suffer it to remain; as by the fluttering it makes to disengage itself, others will be attracted to the bush, and thus several may be taken together. The hours proper for this sport, are from sun-rise till ten o'clock; and from one, to sun-set. Another method of attracting birds is, by a *stale*; a bat makes a very good stale, but it must be fixed so as to be perceptible at a distance. An owl is still more eligible for this purpose, being followed by the small birds, whenever it appears. If a live owl, or bat, cannot be obtained, the skin of one stuffed will likewise answer; nay, even the image of an owl carved in wood, and painted of the natural colour, will produce the desired effect.

When the German composition is used, care should be taken to seize the bird, when entangled, to prevent it from attempting to free itself by its beak; otherwise it will be destroyed by the deleterious effect of the oil.

Singing-birds are principally the nightingale, black-bird, thrush, starling, linnet, lark, red-breast, Canary-bird, bull-finch, and gold-finch. Their first note is termed *chirp*, which is repeated at short intervals: the second is denominated *call*, being a repetition of the same note, and the third sound is termed *recording*, which a young bird will do for nearly a twelvemonth, and when perfect in his lesson, he is said to *sing his song round*. Their notes are not more natural to birds, than language is to man; and they all sing in the same key.

PRESERVATION of BIRDS. Various methods have been attempted by naturalists, to preserve animal substances from putrefaction; but, from the want of a proper antiseptic, many curious animals, and particularly birds from foreign parts, are imported in a very imperfect state. The following process appears to be the most easy and effectual:

After opening the bird, by a longitudinal incision from the breast to the vent, dissecting the fleshy parts from the bones, and removing the entrails, eyes, brains, and tongue, the cavities, and inside of the skin are to be sprinkled with the following powders: Take of corrosive sublimate $\frac{1}{4}$lb. pulverized nitre $\frac{1}{2}$lb. burnt alum $\frac{1}{4}$lb. flowers of sulphur $\frac{1}{2}$lb. camphor $\frac{1}{4}$lb. black pepper, and coarsely ground tobacco, one pound each; mix the ingredients well together, and keep them in a glass vessel closely stopped. First insert the eyes, and stuff the head with cotton or tow; then pass a wire down the throat, through one of the nostrils, and fix it into the breast-bone: wires are likewise to be introduced through the feet, up the legs and thighs, and fastened into the same bone; the body is afterwards stuffed with cotton to its natural size, and the skin sewed over it. In whatever position the bird is placed to dry, the same will afterwards be retained.

Small birds may be preserved in brandy, rum, arrack, or first runnings; but, by these means, the colour of the plumage is liable to be extracted by the spirit. Large sea-fowl have thick strong skins, and such may be skinned; the tail, claws, head, and feet, are to be carefully preserved, and the plumage stained as little as possible with blood. The inside of the skin may be stuffed as recommended above.

Mr. BANCROFT, in his Natural History of Guiana, says, that several persons in the colony are advantageously employed in preserving a variety of beautiful birds for the cabinets of European naturalists. Their method is, to put the bird in a proper vessel, and cover it with strong wine, or the first running of the distillation of rum, in which it remains for twenty-four or forty-eight hours, till the liquor has penetrated every part of its body. The body is then taken out, and its feathers, which are not in the least injured by this immersion, being placed smooth, it is put into a machine made for the purpose, and the wings, tail, &c. arranged agreeable to nature. In this position, it is placed in an oven moderately heated, where it is slowly dried, and will ever after retain its natural attitude, without danger of putrefaction.

The following simple composition may be employed with success, for the same purpose: Common salt one pound, powdered alum four ounces, ground pepper two ounces. The bird intended for preservation, should be opened from the lower part of the breast-bone to the tail, with a pair of sharp-pointed scissars, and the whole of the intestines taken out. The cavity is then to be filled with the mixture, and the lacerated part should be properly stitched. The thorax, from the beak to the stomach, must be filled with the same composition, reduced to a finer powder. The head is to be opened near the root of the tongue, with the point of the scissars, and the structure of the brain destroyed, by moving them in a circular direction,

rection, and as soon as they are withdrawn, the cavity is likewise to be filled with the mixture. After having been suspended by the legs, for a few days, the bird may be fixed in a frame, in its natural attitude.

Bird-grass. — See Roughish Meadow-grass.

BIRD-CHERRY; or the *Prunus Padus*, L. is a species of cherry-tree, growing wild in several parts of Britain, especially in the North of England, and some parts of Norfolk.

The Bird-cherry tree attains a height of fifteen or twenty feet, is of a shrub-like growth, with a branchy top; its leaves are large, oblong, rough, and serated; the fruit large and red.—See With. 455.

From the fruit of the Bird-cherry an agreeable wine may be produced: and it is affirmed in the Transactions of the Swedish Academy, for 1774, that its kernels, when deprived of their external rind, afford so good a substitute for almond milk, that the most experienced persons cannot ascertain the difference. Its wood is much used on the Continent, by cabinet-makers and upholsterers;—its inner bark affords a green lixivium for dyers.

Bird's Eye. See Primrose.

BIRD's FOOT (Common), or *Ornithopus perpusillus*, L. is an indigenous plant; the yellow flowers of which blow in July or August; and the legumen, or pulse, is curved in the form of a bow. See Curt. *Lond. fasc.* 6.

This plant affords a good fodder for sheep, when grass is scarce, in the latter end of autumn.

BIRTHWORT (Slender), or *Aristolochia clematitis*, L. is the only indigenous species of that plant; it has heart-shaped leaves, an upright stem, and its root is long and slender.—See *Engl. Bot.* 398.

On being chewed, the Birthwort instantly imparts an aromatic bitterness, not ungrateful to the palate. It possesses medicinal virtues, and is prescribed as an attenuant of viscid phlegm, and promoter of the fluid secretions. The dose in substance is from a scruple to two drams. There are four other species of this plant imported for medicinal purposes, particularly the *Aristolochia longa*, a native of France, Spain, and Italy. It is applied externally in cutaneous diseases, as likewise for cleansing and healing wounds and ulcers.

BISCUIT, a kind of bread manufactured by confectioners, of fine flour, eggs, sugar, and rose or orange water; or of flour, eggs, and sugar, with aniseeds and citron-peel.

Sea-Biscuit, a sort of hard, dry bread, formed into flat cakes: when intended for long voyages, it is four times baked, six months before it is shipped; after which it will continue good during a whole year. In order to preserve such bread from insects, Mr. Hales recommends the fumigation of the casks with sulphur, after they have been filled. Biscuits may likewise be preserved, by packing them in casks well calked, and lined with tin.

As the manufacture of sea-biscuits is of considerable importance to a maritime country, we shall communicate the method of baking practised in France.

In the preparation of biscuit, a proportion of ten pounds of leaven (rather more stale than that commonly used for bread), is diluted in warm water, with one hundred pounds of flour, which is kneaded; but the water should be added by small portions, to prevent the necessity of adding more flour: when the dough can no longer be worked by the hand, it is pressed with the feet till it is perfectly smooth, glutinous and compact. The kneading being finished, the dough is worked up in parts: at first it is formed into rolls, which again pass through the hands of the baker; this is called *rubbing*. When the weight of each piece is determined, it is made round, flattened with a rolling pin, and then placed on a table or board exposed to the fresh air, in order to prevent too quick fermentation. Care is taken that the oven be less heated for the baking of biscuit than bread; and as soon as the last cake is formed, that which has been first made, is pierced with several holes, with the point of an iron, which at once flattens it, and gives vent to evaporation: it is then placed in the oven. The biscuits are kept there about two hours, and when drawn out, they are packed with great caution in boxes, lest they should break. Each box commonly contains either a half, or a whole quintal; and, when filled, is placed in a close, warm room, with which the heat of the oven has a communication. The biscuit here parts with its superabundant moisture, and undergoes what is called a *sweating*.

A good biscuit breaks clean and crisp, has a shining appearance within, and the outside is glossy. When soaked, it swells considerably in the water, without crumbling, or sinking to the bottom of the vessel.

As the composition of biscuit is connected with the general principles of making bread, we shall only observe, that the defects which prevail in many bake-houses are similar to those where biscuit is prepared; such as an imperfect grinding, which leaves the bran in the flour, or the flour in the bran, and injures the manufacture. Ovens too high, and not closely stopped, consume much fuel, and produce an indifferent baking.

One of the first rules in the preparation of biscuit should be, never to make it of any but choice wheat, very clean, and *dry*, because it ever continues to carry with it this original principle of preservation; while corn, which is naturally moist, be it ever so well ground, and worked, has a tendency to become worse. For this reason, rye and maize are unfit to be manufactured into biscuit.

It must be confessed with regret, that sea-biscuit of the best preparation often carries in it a principle of destruction. Sometimes it is in the bran, which occasions insects, and hollow spaces in the interior part of the biscuit, giving it a disposition to mould; and sometimes it is a want of cleanliness which prevails in the bread-room of the vessel.

M. Cardon, a biscuit-baker of Hesse, in conjunction with four others of the business, has recently made some experiments, the result of which is: that 100lb. of flour give 126lb. of dough; which, divided into cakes of eight or nine ounces, when well baked, afford 90lb. of biscuit. Instead of making use of old leaven, and of ten or twelve pounds weight to each quintal of flour, he recommends to use the leaven while fresh, in a quantity of fifty pounds, and to make the dough less firm, that it may be kneaded with more ease. He has shewn biscuit, made after this manner, to several masters of ships, who have found it excellent, and that it stands the test of floating on the surface of water, without falling to pieces.

What an expence would it save the State, and how many valuable lives would be preserved, if biscuit were made with sufficient skill, and attention to economy!

BISMUTH, or Tin-glass, one of the semi-metals, of a reddish or light yellow colour, and a lamellated texture: it is moderately hard and brittle, so that it breaks under the hammer, and may even be reduced to powder.

Most metallic substances, by an union with bismuth, become more fusible; hence it is used in the making of solder, printers' types, pewter, &c.

Bismuth reduced to powder, mixed with the white of eggs, and applied to wood, gives it the appearance of being silvered—when it is gradually dried, and rubbed with a polisher.

This semi-metal is commonly deposited in cobalt-ores; which, when of a high red colour, are called *bismuth bloom*, or *flowers of bismuth*. To this mixture may be ascribed the property which bismuth-ore has of making sympathetic ink, similar to that formed by a solution of the regulus of cobalt.—See INK.

In dyeing, a solution of Tin-glass in aqua fortis has lately been recommended by DAMBOURNEY, for fixing certain colours on wool, in preference to alum, or other neutral salts.—See DYEING.

In medicine, the calx and flowers of bismuth were formerly used, in cases where antimonial preparations are now employed with greater safety, and equal effect; so that the former are, at present, chiefly converted into pigments and cosmetics.—Nevertheless, we are possessed of the most convincing proofs, that the *magistery of bismuth* is one of the most powerful anti-spasmodics, especially in cramps of the stomach. When cautiously administered, in doses from half a grain to one grain, in simple water, repeated every half hour, or oftener, according to circumstances, it affords speedy relief of the most excruciating pain; and is, in this respect, of superior efficacy to the celebrated flowers of zinc. But we think it our duty to repeat, that both medicines require the greatest precaution.

BISTORT (Great), or Snake-weed; the *Polygonum bistorta*, L. a native species of knot-grass, most plentiful on meadows and pastures, in the northern counties of England: it has a thick oblique root, about the size of a finger, blackish brown without, and reddish within; a simple round, slender stem, nearly two feet high; oval leaves, and the stalk terminates in thick short spikes, of whitish red flowers, which appear in July, and are productive of seeds in August.—See WITHERING, 382; and *Engl. Bot.* 509.

As this indigenous plant is subservient to many useful purposes, we have been more particular in its description, than the limits of our work will permit on future occasions.

Cattle and sheep are exceedingly partial to the herbage of the Great Bistort; but horses will not eat it. The young leaves are excellent for culinary use; and a small quantity of the root, reduced to powder, and added to the dough in baking, communicates an agreeable taste to the bread, and improves its salubrity.

The Great Bistort has likewise been usefully employed in the arts of dyeing and tanning. According to GLEDITSCH and BAUTSCH, two creditable authors, the herb with its blossom has, by tanners on the Continent, been found to be a proper substitute for oak-bark; and DAMBOURNEY assures us, that from the root of this plant he obtained a decoction of a *mordoré* shade, in which he dyed wool of a real beaver colour, after having previously immersed it in a ley, saturated with a solution of bismuth.

All the parts of this plant have a rough, austere taste: the root, in particular, is one of the strongest vegetable astringents produced in this climate; and therefore justly recommended in intermittent fevers, immoderate hemorrhages, and other fluxes, both internally and externally, where the constitution of the patient requires such a medicine. According to a late popular writer, it has often, and especially in agues, been given in larger doses than those commonly administered: he has prescribed it both, alone, and together with gentian, to the amount of three drams in one day. It is allowed to be a very powerful styptic, and consequently possessed of antiseptic properties; but we doubt, whether it is sufficiently efficacious to supersede the use of the Peruvian bark, or even that of the white willow.

BISTORT (Small), Welch, or Alpine; the *Polygonum viviparum*, L. is likewise an indigenous plant, which grows on the moorlands in several parts of Westmoreland and the North Riding of Yorkshire: it has a smaller root than the preceding species; a simple slender stem, six inches high, spear-shaped leaves, and the stalks and branches terminate by spikes of whitish red flowers, which appear in June or July, and bear seeds in August.—See WITH. 383; and *Eng. Bot.* 669.

Although we have no distinct account of the economical and physical uses of this plant, yet it may be rationally inferred, that it is not inferior to the preceding species. Indeed, GMELIN informs us, that its root is so far from being astringent, in the island of Kamtschatka, that the inhabitants eat it in a raw state; and STELLER, a late traveller, found it sufficiently sweet and nutritive, to support him without any other aliment, for several days. The Samoiedes also eat it as a sweet and wholesome food. Several other nations dry and reduce this root to flour, of which they bake good bread. If credit be due to OLOFF, who has visited Iceland, the inhabitants of that inhospitable climate make bread, even of the small knots which grow on the upper part of the stalk.

BITE, of a mad dog, an unfortunate accident which but too frequently happens in hot summers; and is supposed to be occasioned chiefly by suffering that faithful animal to feed upon putrid meat, without supplying it with sufficient water; but more probably originates from a specific contagion, like the small-pox, &c.—The disease thence arising in the human species, is called Canine Madness, or, according to medical writers, *Hydrophobia*; a term which literally signifies "dread of water."

This virulent disorder does not, in general, manifest itself till a considerable time after the bite; for, though in some instances it has commenced in seven or eight days after the accident, the patient often continued in health for twenty, thirty, or forty days, nay, sometimes for several months. If the wound be not prevented, it will, in most instances, be healed long before the symptoms of the disease appear; though it frequently resists all healing applications, and forms an ulcer discharging a quantity of matter. The approach of the disease is known by the cicatrix of the wound becoming hard and elevated, and by a peculiar tingling sensation in the part affected; pains shoot from it towards the throat: in some cases it is surrounded with livid or red streaks, and seems to be in a state of inflammation; more frequently, however, no remarkable external change can be perceived. But the patient soon becomes melancholy, prefers solitude, and is troubled with nausea. Sometimes the characteristic symptom of the disease, *the dread of water*, suddenly attack the patient, and every attempt to swallow liquids, is accompanied with the most painful sensations. This appears to be a circumstance peculiar to the human race; for mad animals do not evince any dread of water. There is not the least doubt, that the disease is occasioned by the saliva of the mad creature being mixed with the human blood. Unless, therefore, part of the true skin be injured, the poison will not be communicated; but, in the contrary case, the smallest quantity is sufficient to produce the fatal effect. Hence, if the cuticle has been wounded, it is absolutely necessary to remove the surrounding muscular substance by the knife, and to lose no time in submitting to this operation; as it is the only certain and effectual preventive. It is, however, of consequence previously to be convinced, whether the animal has been actually mad; though it is affirmed by creditable writers, that the bite of creatures which were neither diseased nor raving, nay even the bite of healthy dogs, has been productive of hydrophobia. Others have maintained, that the very breath of a mad dog, as well as the blood of a hydrophobous patient touched by a sound person, have been attended with a similar effect.

In order to ascertain whether a dog is really infected with that distemper, the following particulars deserve attention. Several days previously to the invasion of the disorder, the animal becomes sullen, and shews equal indifference to his master, his food, and drink. His ears and tail droop; instead of barking, he growls and snaps at every surrounding object, runs about irregularly, is no longer able to distinguish his master from strangers, and lolls out his tongue, which is parched, and of a livid hue. At length, he drops down suddenly, starts up again, bites whatever seems to obstruct his passage, and in this condition he seldom survives twenty-four or, at the farthest, forty-eight hours.

Persons bitten during the last period of the disordered animal, are in the greatest danger from the contagious nature of the saliva. If the disease has actually been communicated, the pulse indicates spasms, but it is not always feverish; the patient generally feels a burning a burning heat in the throat and injured part, according to the degree of violence with which the malady is accompanied. But the proximate cause of the affection appears to be confined to the nervous system, unconnected with any other disorder; so that patients, labouring under the influence of hydrophobia, have overcome the small pox, and quartan agues, without any aggravation of symptoms. Hence opiates, and other narcotics, as is the case in many nervous diseases, produce no effect. As it is generally allowed, that canine madness, if the dread of water has once taken place, can seldom be cured, the most essential part of the treatment will be the speedy application of preventives. For this reason, we have already stated the immediate necessity of cutting away the parts contiguous to the wound, especially where that operation can be performed, without injuring any large blood-vessel. Beside this precaution, the wound should be frequently washed, by pouring cold water upon it from a considerable height; and to prevent the canine virus from remaining about the wounded part, it should be kept open, and a discharge of matter promoted for several weeks; by stimulating ointments, mixed with cantharides, or similar applications.

Among other means of destroying the contagious matter at the part, both the actual cautery, and burning with gunpowder, have been occasionally employed; as fire is one of the most powerful agents. Others have washed the affected place with vinegar, or caustic alkali properly diluted; the latter of which has been found more effectual.

Bathing in sea-water, as well as drinking it, have been prescribed as preventives. — Dr. Mead, in his treatise on this subject, asserts, that the greatest success has been obtained from diuretics, and consequently directs the following powder: Take ash-coloured ground-liverwort, half an ounce; black pepper two drams: reduce them separately to powder, then mix them together, and divide the whole into four doses, one of which must be taken every morning, fasting, for four days successively, in half a pint of warm cows-milk.

The famous East India specific is composed of twenty-four grains of native, and an equal proportion of factitious cinnabar pulverized, with sixteen grains of musk, and taken in a glass of arrack, or brandy. It is esteemed a great antispasmodic, and an infallible remedy for preventing the effects of the canine virus.

Mercury has been recommended as an efficacious preventive, when applied to the wound by friction, and taken inwardly in the form of calomel, to raise, if possible, a slight salivation. At the same time, venesection, opium, the bark, and camphor, have successively been administered in large quantities; the warm bath; and every remedy that human invention could suggest. M. Sabatier mentions an instance in which, by repeated attacks of a mad dog, the patient had received twenty-five wounds, and above fifty scratches: these were all radically healed, by the application of the cautery, and of fire, which completely destroyed the poison.

As no specific remedy has yet been discovered for the cure of this dreadful disorder, we shall suggest the following plan of treatment, which, by experience, has been found to be the most effectual.

After the bitten part has been cut away, and the wound washed with a pickle made of vinegar and salt, it should be dressed twice a day with yellow basilicon, to which may be added a little red precipitate of mercury, or a small portion of the powder of cantharides. Next, it will be advisable to have immediate recourse to diuretic and sudorific remedies; and for this purpose we recommend the following medicines: Eight prepared millepedes; half an ounce of Venice treacle; two drams of volatile salt of hartshorn; one dram of camphor, and eight ounces of what is called water of acetated ammonia. Mix these ingredients, and let the patient take a small tea-spoonful every hour the first day, till it be attended with profuse perspiration, and a copious discharge of urine: the second day, two tea-spoonfuls may be given every two hours; and, in this proportion, the doses may be gradually increased, till he is enabled to take a table-spoonful, several times a day. But if, by such progressive doses, the urinary passages should be too much stimulated, or even blood be evacuated, it will be necessary to suspend the use of this medicine, for a few days, till the violence of the symptoms has abated; and then to add, to each draught, a little gum-arabic dissolved in water; or to drink lintseed-tea, during the course. We have stated this prescription, on the authority of Dr. Selle, late physician to the King of Prussia, and one of the most eminent medical philosophers on the Continent.

In those cases, however, where the absorption of the poison cannot be prevented, and the dread of water has already seized the patient, it will be useless to trouble him with liquid medicines; but large doses of musk and opium then become necessary; and every kind of irritation ought to be carefully avoided. Although the cold bath, and mercurial frictions, have been very generally used, and sometimes been attended with apparently good effects, yet little or no reliance can be placed on them, when the disease has made any progress in the system. We are firmly persuaded that, where the bite of a mad dog has been neglected for several days, or weeks, neither the skill of the most experienced practitioner, nor the most celebrated Nostrums, can afford the desired relief.

BITTER, is a term applied to substances of a peculiar taste, and generally opposed to sweet; the principal of which are, the Gentian and Bistort-roots, Hops, Lesser Centaury, Carduus, &c.

Most bitters impart their virtues, both to watery and spirituous fluids. By distillation, their taste is in a great measure destroyed; but, on evaporating the watery solution to a thick consistence, the bitter principle remains unaltered, and is frequently improved. See Extracts.

Dr. Darwin ingeniously observes, that the bitter, narcotic, and acrid juices of plants, are secreted by their glands, for defending vegetables against the depredation of insects, and larger animals. An acrid juice exists in the husks of walnuts, and in the pellicle, or skin, of the kernel; but not in the lobes, or nutritious part. Bitters appear to have been excluded from the *seed*, lest they might have been injurious to the tender organs of digestion of the embryon plant. In some seeds, however, he adds, there is a bitter quality, which refuses to mix with the oleaginous part; as the oil expressed from bitter almonds is as tasteless as that from the sweet kind.

Vegetable bitters possess the combined properties of astringents and aromatics. Hence they are frequently employed in weakness of the stomach and intestines; in cold habits, where the bile and humours require to be attenuated or diluted; and for promoting natural evacuations, particularly those by the pores and the urinary canal. They are also of service in many cases of indigestion, loss of appetite, flatulency, &c. when these complaints proceed from muscular weakness, or a phlegmatic and inert state of the fluids. But, in constitutions where the fibres are tense and rigid, or an immoderate heat and inflammation prevail, the continued use of bitters, especially in the gout, would sensibly increase the disorder, and frequently determine it to the kidneys. Thus the secretion of urine might be greatly checked, to the injury of the patient, and at length either dropsy or consumption would be the natural consequence.

It is not easy to conceive, in what manner bitters taken by the stomach operate on the human system; though they are generally considered as powerful *tonics*. So much is certain, that they do not act as stimulants; because neither the frequency of the pulse, nor the force of the circulation, is increased by their use. Nor can it be maintained, that their operation is similar to that of astringents; so that bitters are to be considered purely as tonics, which strengthen, or impart new energy to the muscular fibres of the stomach; an effect which is by sympathy communicated to other parts of the body.

Bitter substances are often used as vermifuges, though seldom efficacious; and externally, as antiseptics. In domestic economy, they are, at present, chiefly employed for the destruction of insects, &c.; but it deserves to be remarked, that there is scarcely a *bitter* root growing in this island, which might not be converted to very useful purposes.—See BREAD.

BITTER SALT. See EPSOM SALT.

BITTER-SWEET. See Woody NIGHTSHADE.

BITUMENS, are inflammable mineral bodies, not sulphureous, or only casually impregnated with sulphur. They are of various degrees of consistence, and appear, in the mineral kingdom, to correspond with the oils and resins in the vegetable. By their peculiar smell, they are easily distinguished from either purely animal or vegetable productions. When the native rock-oils are mixed with concentrated mineral acids, they become thick, and at length consistent: in which state they are called *bitumens*.

There is a thin fluid bitumen called *naphtha*, which is found on the surface of waters, or oozing from clefts of rocks in the eastern countries, particularly Persia. It has a strong smell, very different from that of vegetable or animal oils, is highly inflammable, not soluble in spirit of wine, and almost as limpid as water, with which it is more averse to unite than any other oil. Next to naphtha, in consistence, is *petroleum*, or rock-oil;

oil: the former is collected for making varnishes, and the latter is used for lamps and torches. Genuine naphtha is sometimes recommended in diseases of the nerves, but it is seldom obtained in a pure state.

The solid bitumens are, amber, jet, asphaltum, or bitumen of Judea, and fossil or pit-coal. By distillation, they all yield an odorous water, more or less coloured and saline; an acid frequently in a concrete state, an oil similar to the native rock-oils, but which soon increases in weight, and becomes thicker; and, lastly, a quantity of volatile alkali. The residuum is a charry matter, differing in appearance, according to the nature of the analyzed bitumen.

Barbadoes tar is a bitumen of a consistence between a fluid and solid; and turf or peat is, by some writers, supposed to belong to this class.

It is conjectured by naturalists, that all bitumens are of animal or vegetable origin; and that the circumstances by which they differ from the resinous and other oily matters of vegetables and animals, are the natural effects of time; or of an alteration produced on them by mineral acids; or of both causes combined. This opinion is the more probable, as bitumens, on a chemical analysis, afford oil and volatile alkali, neither of which is found in any other minerals.

BLACK, the darkest of colours, supposed to be owing to the absence of light, as most of the rays which fall on black substances are not reflected, but absorbed by them.

There are many shades or varieties of this colour. The native black substances are, black chalk, pitcoal, black sands, black vegetable juices, and cuttle-fish ink. Those which are the product of fire, comprehend charcoal blacks, soot blacks, and black metallic calces.

Blacks obtained by mixture, are those from iron, silver, and from a combination of lead with sulphur. The infusions of certain vegetable astringents, mixed with green vitriol (which is a solution of iron in the sulphuric acid), produce a deep black colour, of most extensive use for dyeing and staining. The astringent substances chiefly employed for this purpose, are the excrescences of the oak-tree, called galls; all parts of this tree, as the leaves, acorns, and more particularly the bark and wood. A great variety of other vegetable substances, such as the small branches and flowers of the sumach-tree, alder bark, bistort root, and, in general, those which are astringent or corrugating to the taste, possess similar properties. The power by which these vegetables strike black with vitriol, and their astringency, are proportional to one another, and seem to depend on one and the same principle. Of the other properties of this astringent and colouring matter, little more is known, than that it is dissolved and extracted both by water and spirit of wine, and that it does not exhale on the evaporation of the menstruum.—See the article Dyeing.

The only native vegetable black, is the juice of the cashew nut-tree, or *Anacardium occidentale*, which probably is the tree that yields the black varnish of China and Japan.—See Varnish.

Lastly, there are also several colours artificially prepared for the use of painters, such as lamp-black, ivory-black, German-black, &c.—See COLOUR-MAKING.

BLACK-BIRD, or *Turdus merula*, a species of the thrush. When young, its plumage is of a rusty black; but at the age of one year, being the period of its full growth, its feathers acquire a deep glossy black, the bill a bright yellow, and the edges of the eye-lids a similar colour.

The black-bird loves solitude, and chiefly frequents thickets, and the remotest parts of plantations and woods. In severe winters, however, it is sometimes compelled to approach barns and farm-yards, in search of food. It builds earlier than any other bird, and forms its nest in hedges and thickets, of withered grass and moss, plastered with clay, and covered with hay or straw. Its eggs are commonly four or five in number, of a blueish-green colour, marked with irregular dark spots. About the latter end of March, it has a young brood, which may be taken at ten or twelve days old. The only way to distinguish the young cock from the hen, is by its colour; as that of the former is of a deeper black. When young, they are commonly fed with bread and milk, or curds; but the most proper nourishment is a sheep's heart chopped small, mixed with bread, and moistened with water: they should be fed every two hours, and kept very clean.

This bird, especially the male, has a very pleasing note, but too loud for a confined situation; and it may be taught to whistle tunes to a pipe. It sings during the spring, and the early part of summer; is silent in the moulting season, and resumes its music in the latter part of autumn.

BLACK CATTLE, among graziers, denotes all the larger kinds of domestic animals which contribute to our support or convenience; such as oxen, cows, horses, &c. As these will be respectively treated of in their proper order, we shall, therefore, at present, state only the essential properties of a perfect breed of *black cattle*, designed for the purposes of the dairy, as laid down by Mr. MARSHALL:

1. The head small and clean, to lessen the quantity of offal. 2. The neck thin and clean, to lighten the fore-end, as well as to lessen the collar, and make it sit close and easy to the animal in work. 3. The carcass large, the chest deep, and the bosom broad, with the ribs standing out full from the spine; to give strength of frame and constitution, and to allow sufficient room for the intestines within the ribs. 4. The shoulders should be light of bone, and rounded off at the lower point, that the collar may be easy, but broad, to give strength; and well covered with flesh, for the greater ease of draught, as well as to furnish a desired point in fattening cattle. 5. The back ought to be wide and level throughout; the quarters long; the thighs thin, and standing narrow at the round bone; the udder large when full, but thin and loose when empty, to hold the greater quantity of milk; with large dug-veins to fill it, and long elastic teats for drawing it off with greater ease. 6. The legs (below the knee and hock) straight, and of a middle length; their bone, in general, light and clean from fleshiness, but with the joints and sinews of a moderate size, for the purposes of

strength and activity. 7. The flesh ought to be mellow in the state of fleshiness, and firm in the state of fatness. 8. The hide mellow, and of a middle thickness, though, in our author's opinion, this is a point not yet well determined.

Black cattle, as well as horses, have been observed to thrive better in salt-marshes, than in fresh-water meadows, or upland pastures; and it has been conjectured, that the herbs produced by the lands near the sea, are more healthy for herbaceous animals, than such as grow on higher lands. But it is said, that the saline particles with which the earth, as well as its produce near the sea, is strongly impregnated, occasions this beneficial change in the condition of cattle; as these salts purge away the foul humours which the beasts have contracted, either by idleness, or by being over-heated in labour. As cattle are naturally fond of salt, and, if left at their liberty, will take no more of it than what is conducive to their health, it is recommended to lay common sea-salt in the fields, for them to lick as often as they please.—See SALT.

BLACK CANKER is the name given by husbandmen to a caterpillar which commits great devastation among turnips. The best method of destroying these insects is, to turn a body of ducks into the fields infested by them. In the year 1784, Mr. COKE purchased four hundred ducks, and set them at liberty on thirty-three acres of turnips, which they completely cleared of the caterpillar in five days. In a relative proportion, twenty or thirty might be employed upon a small farm, with considerable effect.

Black Clock. See BEETLE.

BLACK FLY, an insect that attacks the seedling leaves of turnips, cabbages, and many other vegetables. In summer, it may frequently be seen in swarms on the wing near the ground, searching for, and settling on the fresh bites; and thus, in some seasons, destroying thousands of acres. Its ravages may be prevented by the following means:

Mix one ounce of flour of sulphur with three pounds of turnip-seed daily, for three days successively, in a glazed earthen pot, and keep it closely covered, stirring it well at each addition, that the seed may be impregnated with the sulphur: then sow it as usual, on an acre of ground, and the fly will not attack it till the third or fourth seedling leaf is formed, by which time the plant will have acquired a bitterish property, and consequently be out of danger. Others advise to fix alder-bows in a harrow, and draw them over the land immediately after the seed is sown. Again, others bruise the bows, and fumigate them with burnt tobacco, and a small quantity of asafœtida. —See TURNIP.

BLACK LAND, in agriculture, a term used to denote a peculiar kind of clayey soil, which in rainy weather appears of a dusky or blackish colour, though, when dry, it more resembles a pale grey, than a true black. On ploughing this soil, especially in wet seasons, it is apt to adhere to the plough-shares; and assumes a darker and muddier appearance, the more it is worked. It generally abounds with small white stones, and always contains a considerable proportion of sand. A soil of this description may be improved, by manuring it with such substances as tend to pulverize the ground, and deprive it of its tenacity.—See LAND and MANURE.

BLACK LEAD. See LEAD.

BLACK LEATHER is that which, having passed through the hands of the currier, after being scored and rubbed three times on the grain side with copperas-water, acquires a black colour, instead of the russet, as left by the tanners. —See LEATHER.

BLACK-LEGS, a name given by the Leicestershire breeders to a disease incident to calves and sheep. It is a kind of gelatinous humour, which settles between the skin and flesh of the neck, and not unfrequently in their legs. To remove this troublesome complaint, we conceive that the sal-ammoniac dissolved in the smallest possible quantity of water, and applied to the parts affected, by means of proper compresses, or even simple friction, conjoined with suitable exercise, would be the most effectual remedy.

BLACK TIN, in mineralogy, a term given to tin-ore when it is ready to be melted into metal, after having been well stamped, washed, and dressed. It is taken up from the washing-troughs in the form of a fine black powder, and from this circumstance is called *black tin*; two pounds of which being melted, will produce one pound of *white tin*. The principal mines from which this useful metal is obtained in Britain, are those in Cornwall.—See TIN.

BLACK WADD, in mineralogy, is a kind of ore of manganese, remarkable for its property of taking fire, when mixed with a certain proportion of lintseed-oil. It is found in Derbyshire, and is a useful ingredient in paints; for on being ground with a large quantity of oily matter, it loses the property above-mentioned.

BLACKBERRY, the fruit of the common bramble, or *Rubus fruticosus*, L.—See BRAMBLE.

These berries, when eaten immoderately, and too frequently, are apt to produce the most violent effects, as fever, delirium, &c.

BLACKING, in general, signifies a factitious black; as lamp-black, shoe-black, &c. The common oil-blacking consists of ivory-black mixed with lintseed-oil.—The shining blacking is made in various ways, and affords employment to several persons in the metropolis, who prepare it for the supply of the shops. The preparation which has experienced the most extensive sale, is probably that of Mr. BAYLEY. His patent being expired, we shall communicate the particulars of the process. Take one part of the gummy juice that issues, in the months of June, July, and August, from the shrub called the goat's thorn; four parts of river-water; two parts of neat's foot, or some other softening, lubricating oil; two parts of superfine ivory-black; two parts of deep blue, prepared from iron and copper; and four parts of brown sugar-candy. Let the water be evaporated, and, when the composition is of a proper consistence, let it be formed into cakes, of such a size that each cake may make a pint of liquid blacking.

Frankfort-Blacking is made by a process much more simple. A quantity of the lees of wine is burnt in a well-closed vessel, and the residuum reduced to powder, which, when mixed with water, is fit for immediate use; or, if made into cakes, may be preserved for any length of time.

Ivory-black, as imported from Holland, is prepared in the following manner: Small pieces of ivory are smeared with a little lintseed-oil, and put into a black-lead crucible; this is covered with a similar vessel inverted, but of a smaller size, and the crevices are secured with a lute made of potter's clay and rye-flour, so as to prevent the access of external air. Thus prepared, the whole is exposed to a red heat, not too intense, for about half an hour, after which it is taken out and suffered to cool gradually. When cold, the charred ivory, or bones, where the former is scarce, ought to be reduced to powder, and triturated, with the addition of water, on a painter's stone, till it assumes the form of a smooth paste. In this state it is moulded into small cones, and allowed to dry.—Similar black may also be obtained by burning the stones of peaches, after having previously dried them and removed the kernels. This useful fact we state on the authority of HOCHHEIMER, a German writer on general economy.

BLADDER, in anatomy, a thin membranous, expanded receptacle of some juice or humour secreted in the animal body. This term principally applies to the vessels in which the urine and bile are respectively collected; and hence the two chief reservoirs of this nature are the *urinary bladder*, and that containing the *bile*. In this place we shall treat only of the former, which is situated within the cavity of the pelvis: its form is oval, and being a continuation of the abdomen, it is almost uniformly surrounded with bones, though below, and at each side, encompassed by muscles. It is remarkable, that this vessel is considerably larger in the female than in the male sex.

Nature has wisely contrived that the human bladder should possess a high degree of expansion, for containing the watery parts secreted from the chyle, as they would otherwise mix with the blood of animals, and render that fluid too thin for the performance of its functions. Though a large proportion of such aqueous humours, from three to four pounds every day, are insensibly evacuated by the skin, yet a still greater quantity must be secreted by the kidneys, and thence conducted to the bladder, lest they should accumulate between the interstices of the cellular membrane, which covers all the muscles, and occasion dropsical swellings. On the other hand, the diseases incident to the bladder are various, but principally arise from debility, spasms, and calculous concretions; for an account of which, we refer to the articles GRAVEL, STONE, and URINE. At present, we shall confine ourselves to the inflammatory state of that vessel, which requires immediate relief. This dangerous malady is occasioned by stimulating medicines; gravel or stones lodged in the orifice of the bladder; violent exercise after a long retention of urine, and especially in hot weather; lying in soft, effeminating feather-beds, &c. The symptoms are manifest from an acute burning pain, and tension of the part; frequent inclination to go to stool, and a constant desire to make water, while the patient is in a state of fever. As, under such circumstances, no time should be lost in applying for proper advice, it would be needless to enlarge on the treatment of the disease; but we shall observe that, beside bleeding and purgatives both by the mouth and injections, it will be necessary to drink plentifully of emollient decoctions, or other beverage of a cooling and diuretic nature. Previous to the arrival of a medical man, leeches may be applied to the part affected, the lower belly should be diligently fomented with warm water, and the patient be placed in a tepid bath, not exceeding 98°.—If, however, the pain suddenly abates, and is succeeded by cold sweats, hiccough, fetid urine, or a total suppression of it, there is reason to apprehend a mortification, and fatal issue of the disease.

BLADDER-NUT-TREE, or the *Staphylea*, L. is a plant containing two species, the *pinnata*, indigenous in Britain, and the *trifolia*, or three-leaved bladder-nut, a native of Virginia. For the first, to which we shall confine our account, see WITHERING, 317. The flowers are white, and grow on long pendulous foot-stalks; the plant blows in June, and may be found in hedges near Pontefract, and in Kent.

This shrub affords an oil which might be employed for lamps, but the trouble of expressing it is too great. The wood is hard, and used on the Continent for various domestic purposes; and the flowers are much frequented by bees.

BLAIN, in farriery, a distemper incident to horses and cattle, consisting of a tumor which grows on the root of the tongue, and swells to such a size as frequently to stop respiration. It is caused by excessive irritation and heat of the stomach, and discovers itself by the animal's gaping, and hanging out its tongue. The method of cure is as follows: Lay the beast on the ground, open the tumor, and wash it with vinegar and a little salt.

BLANCHING, the art or manner of rendering any thing white.—See BLEACHING.

The blanching of woollen stuffs is performed with soap, chalk, sulphur, &c. Silk is blanched with soap and sulphur; and wax is rendered white by exposing it to the action of the sun and dew.—See WAX.

BLANKET, an article of commerce so well known in domestic economy, that any definition of it would be superfluous.

The best kind of blankets is manufactured at Witney, in Oxfordshire: their excellency is attributed by some persons to the abstersive nitrous water of the river Windrush, with which they are scoured; while others imagine it is to be ascribed to a peculiar looseness in the spinning. Blankets are made of felt-wool, or that from sheepskins, which is divided into several sorts. Of the head-wool and bay-wool they make blankets of ten, eleven, and twelve quarters broad; of the ordinary sort, those of seven and eight quarters; and of the best tail-wool, are made blankets of six quarters broad, commonly called cuts, and used for seamen's hammocks.—See HYKES.

BLAST, in agriculture and gardening, is a term synonimous with *blight*, which see.

That species of blasts called *uredines*, or *fire-blasts*, is supposed by Mr. HALES to originate from the solar rays, reflected from, or condensed in the clouds, or collected by the steams in hop-gardens, &c. They wither, scorch, and blacken the leaves, blossoms, and fruits of trees, shrubs, grass, corn, &c. and this devastation is at times extended over whole tracts of ground.

Blatta. See COCKROACH.

BLEACHING is the art of whitening linen cloth, thread, cotton, &c. In the present advanced state of the linen and cotton manufactures of Great Britain and Ireland, the art of bleaching is one of the most interesting and important. Its object is to reduce *flax, cotton, wool,* or the *threads* or *cloths* manufactured from them, to a state of perfect whiteness. To attain this end, oils, metallic oxides, earthy impregnations, resins, and other animal, vegetable, or mineral particles, containing any colouring matter, must be discharged from the texture of the substances manufactured.

The process of bleaching is divided into five parts, viz. 1. Steeping and milling; 2. Bucking and boiling; 3. Alternate watering and drying; 4. Souring; and, 5. Rubbing with soap and warm water, starching and blueing. By the first of these methods, the cloth is in a great degree freed from its superficial foulness, and is rendered more pliant and soft. The second process is the most important of the whole. Its object is to loosen and carry off, by means of alkaline lies, that particular substance in cloth, which is the cause of its brown colour. The operation of alternate watering and drying is as follows: After the cloth has been bucked, it is carried out to the field, and frequently watered, during the first six hours. For, if in the course of that time it be allowed to dry, while strongly impregnated with salts, the latter, by approaching closer together, and being assisted by a degree of heat which increases in proportion to the dryness of the cloth, act with greater force, and destroy its texture. After this time, dry spots are suffered to appear before it receives any water.

By the continual evaporation which takes places on the surface of the cloth, it is evident that this operation is intended to carry off some impurities that remain after the former process of bucking. This is clearly proved from the fact, that the upper side of the cloth, where the evaporation is strongest, attains to a greater degree of whiteness than the reverse side; and the whole likewise turns much lighter on being exposed to the influence of the sun, air, and winds.

Souring. Every person, who possesses the smallest knowledge of chemistry, is aware that alkaline salts may, by various methods, be converted into absorbent earths: One of these is, frequent solution in water, and again evaporating it. A transmutation, therefore, of these salts must be continually going forwards in the cloth, during the alternate waterings and dryings of the former process. The souring process is sooner completed in cold, than in warm weather; and it is now experimentally ascertained, that vitriol is preferable to milk sours in bleaching.

The next is, *hand rubbing with soap and warm water, rubbing-boards, starching, and blueing.* After the cloth has been sufficiently soured, it is washed in the mill, to deprive it of the acrid particles which adhere to its surface. From the mill, it is taken to be washed by the hand, with soap and warm water, to free it from the oily particles which could not be disengaged by the milling. Soft soap is preferred to hard, for this purpose, as the latter contains a considerable quantity of sea-salt, which is prejudicial to the cloth.

The management of coarse cloth in this operation is very different from that of fine; for the former, instead of being worked by the hands (a method which would be too expensive), is laid upon a table, rubbed over with soap, and then placed between what are called rubbing-boards, which have ridges and grooves from one side to the other, in the form of teeth.

The starching and blueing, which is the last operation, differs so little from the process employed by laundry-women, that it scarcely requires description. But it often happens, that the cloth, when exposed to dry in the open air, after being starched, is wetted by rain, which frustrates the effects intended by the operation: to remedy this inconvenience, many bleachers employ a dry-house, where the linen may be dried in all weathers.

As bleaching is a process connected with manufactures, and cannot be performed with advantage by private families, it is useless to enter into farther particulars. But the art is still susceptible of improvement; for scarcely a year elapses, which does not produce some new discovery in this useful branch of manufactures. We shall, therefore, content ourselves with communicating a few of such hints as may prove advantageous to the practical bleacher; and with which, we presume, there are many persons still unacquainted.

The new method of bleaching with the dephlogisticated or oxygenated muriatic acid, or spirit of salt combined with manganese, is founded upon the remarkable property which that acid possesses of destroying vegetable colours; and, though various attempts have been made to introduce it into this country, the difficulties or disadvantages attending it have prevented its general adoption. This acid was first applied to the purpose of bleaching, by M. BERTHOLLET; and the particulars of the process are described at length in a treatise on bleaching, published a few years since at Edinburgh; and likewise in the Supplement to the *Encyclopædia Britannica*.

It is to be regretted, that no exact comparative statement of the difference of expence between the old and new methods of bleaching, has yet been laid before the public; but it is probable that the acid drawn from one pound of salt, will whiten four of linen cloth, without any addition. The expence in this case may appear trifling, but when we compute the vitriolic acid which is employed, and that the residuum is almost useless, it will soon be found to be very considerable; and upon the whole, the advantage may be only in the saving of time: but M. BERTHOLLET asserts, that by this method the texture of the cloth is less injured than by that hitherto practised.

The oxy-muriatic acid is also very generally used for bleaching paper. According to M. CHAPTAL, blotting-paper, when put into it, is bleached without suffering any injury; and old books, and prints, when soiled in such a manner as to be scarcely distinguishable, have been completely restored to their original state. The simple immersion of a print in this acid, is sufficient to produce that desirable effect; but with books, some farther

ther precaution is necessary: they should be unsewed, and the adhering leaves carefully separated, that the whole may be equally impregnated.

Mr. HIGGINS, chemist to the Irish Linen Board, has discovered that the oxy-muriate of lime is, in bleaching, not only cheaper, but in other respects preferable to that of pot-ash. The chemical attraction of the former is somewhat stronger than that of the latter; and, on account of this quality, it does less injury to the cloth. Alternate boilings in solutions of pot-ash, steepings in oxy-muriate of lime, exposure to the action of light, and evaporating water on the green, are found to complete within six weeks, at little more than half the expence, what otherwise cannot be performed in less than double the time.

Notwithstanding this great improvement, Mr. HIGGINS was anxious to diminish still farther the expence attending the process of bleaching. Convinced that the mixtures of *sulphur* with *soda*, are detergents, or cleansers of the most powerful kind, he was naturally led to conjecture, that lime, which, in other respects, possesses properties nearly similar to those of the fixed alkali, might also resemble them in the detergent effect of their combination with sulphur. He made trial: a sulphuret of lime, composed of four pounds of sulphur added to twenty pounds of lime, and diluted in sixteen gallons of water, formed a solution which answered cold, just as well for the bleaching of linen, as the boiling solution of pot-ash. In consequence of this experiment, he recommends, that linen, after being perfectly cleansed from the weaver's dressing, be immersed *alternately* in solutions of sulphuret of lime, and of oxy-muriate of lime, namely, *six times* in each. By this method, linen may be completely bleached, and with a considerable saving of expence. In Ireland, it is at present almost generally adopted.

The same process, with certain convenient modifications, yet always managed upon one common principle, is applicable to the bleaching of linen, cotton, silk, and wool. It has likewise been reduced to practice in France; but in a manner less simple and skilful than in Britain and Ireland.

We shall conclude this article by abstracting the patent lately granted to Mr. TURNBULL, for an improvement in the common process of bleaching cotton, or linen pieces: Take any kind of earth which is easily mixable with water, such as clay, marl, or Fuller's earth, or if that cannot be had, any kind of soft mud or the like, which is put into a boiler to evaporate the moisture, dried, again mixed with water, and passed through fine sieves. This powder is then mixed with quick-lime, which is slacked in the earthy mass, and forms the materials for the several *buckings* which the cloth is to undergo. The pieces are to be worked in the bucking tubs for a number of times, alternating this operation with rinsing and souring, as is usual in the long established method, and afterwards exposing them to the air, on the bleaching ground. The only difference in the process here employed, is the admixture of earthy mud, or clay, to the lime, so that the corrosive power of the latter is diminished, and may consequently be used more freely. In the last buckings, pot-ash is also added to the earthy mixture. Hence the patentee's method unites that of fulling with soap, or washing with alkaline lye; and it is very probable, that by such a combination, not only time, but also expence may be saved, as alkali is the most valuable article used in the process.

The latest work published on this subject is, we believe, a treatise written by M. Pajot des Charmes, of which a translation was lately published in London, by Messrs. Robinson, in one vol. 8vo.

BLEEDING, a term used to express either a spontaneous, or artificial, discharge of blood: in the former case, it is by medical writers called *hemorrhage*; in the latter, *venesection*, or blood-letting, of which last we propose to treat in its place. At present, therefore, we shall consider only those evacuations which Nature directs to take place in the system, and frequently for the benefit of the individual.

1. *Bleeding at the nose* generally arises in full sanguine habits, more commonly in young men than women, especially during adolescence. Exposure to the heat of the sun, a hot room, contusions of the head, or acrid substances introduced into the nostrils, are the general causes of this complaint.—On its first attack, all cumbersome clothes and ligatures, especially those about the wrists and neck, ought to be instantly loosened; the patient should be removed to a cooler temperature, and placed in an erect posture; his hands and legs immersed in tepid water, about milk-warm; and dossils of lint dipped in vinegar, or a strong solution of white vitriol, put up the nostrils. If the bleeding does not abate, or threatens to become more profuse, cold fomentations, either of simple water, or solutions of nitre and sugar of lead, should be repeatedly applied to the forehead and temples, as well as the region of the kidneys and genitals.—One of the most effectual methods of stopping violent bleeding, consists in the unremitted administration of lukewarm, emollient clysters, in such small proportions as may be retained and absorbed by the bowels, while cold fomentations are applied to the abdomen. Meanwhile, the patient should drink lemonade, or water acidulated with a few drops of vitriolic acid, and sweetened with sugar; or if these cannot be had, a mixture of equal parts of vinegar and water may be substituted.

2. *Spitting of blood* may be owing to an abundance of that fluid, an organic debility of the lungs, or an imperfect structure of the chest. It may also proceed from exertions in blowing wind-instruments, loud-speaking, singing, running, wrestling, and excess in drinking, especially after violent exercise. This alarming complaint is attended with a dry cough, and difficulty of breathing: and if the evacuated blood be thin, frothy, and florid, it indicates a rupture of some pulmonary artery; but if it be thick, and of a darkish colour, while the coughing up is accompanied with pain, the disease is then occasioned by a fall, or other external injury. In either case, the diet should be cooling and diluent: hence sweet whey, a decoction of marsh-mallows, or barley, vegetables abounding in mucilage, the mildest laxatives, consisting of manna, tamarinds, phosphorated soda, vitriolated tartar, &c. ought to be instantly resorted to. At the same time, emollient clysters, bath-

ing the legs in tepid water, and a suspension of all mental and bodily exertion, are absolutely necessary. Bleeding, cupping, styptic tinctures, fox-glove, and opium, must be submitted to the discretion of the medical practitioner: and we shall here only observe, that a table spoonful of fine salt, taken dry, has frequently afforded instant relief.

3. *Vomiting of Blood.* See VOMITING.

4. *Discharge of Blood by the urethra.* See URINE.

5. *Bloody Flux.* See DYSENTERY.

6. *Bleeding Hemorrhoids.* See PILES.

BLEND-WATER, also called *more-hough*, a distemper incident to black cattle, which proceeds either from the state of the animal's blood, from the yellows, or from the change of ground, which, if too hard, is apt to produce this evil. To cure it—Take one ounce of bole armenian, as much charcoal as will fill a small tea-cup, and three ounces of the rind of the oak; let the whole be reduced to a powder, and given to the animal in a quart of new milk.

BLIGHT, in husbandry, is a disease incident to plants, and affecting them in various degrees; sometimes destroying only the leaves and blossoms, and frequently causing the whole plant to perish.

Blights are generally supposed to be produced by easterly winds, which convey multitudes of the eggs of insects from some distant quarter; and these being lodged on the surface of the leaves and flowers of fruit-trees, cause them to shrivel and decay.

It is the general opinion, that one principal reason why the environs of London are particularly subject to blights, is the great number of pruned trees and cut hedges near the metropolis; for as all vegetables become more or less sickly when the course of their sap is impeded, the trees in this state are more liable to blight, than such as are vigorous and uninjured by the pruning-knife. It is worthy of remark, that to the westward of London the effects of this distemper insensibly decrease, insomuch, that at forty miles distance it rarely occurs, and at an hundred miles and upwards, it is entirely unknown. This circumstance seems to favour the idea of its being conveyed by easterly winds. But the true cause appears to be, the continuance of these winds for several days, without the intervention of showers or dews, by which the expansion of the tender blossom is checked, so that the young leaves necessarily wither.

To cure this distemper, some persons burn a quantity of wet litter on the windward side of the plants, as it is supposed that the smoke will suffocate the insects: others fumigate the trees, by strewing sulphur upon lighted charcoal, or by sprinkling them with tobacco-dust, or with water in which tobacco-stalks have been infused for twelve hours. Ground-pepper, scattered over the blossoms, has sometimes proved beneficial.

Mr. GULLETT, of Tavistock, is of opinion that great benefit may be derived from whipping the branches of fruit-trees with a bunch of elder-twigs, the leaves of which should be previously bruised. The smell of the elder being extremely disagreeable, no insects will settle on the parts touched by it; and some blighted shoots have even been restored, by first whipping them, and then tying up a bunch of elder-leaves among them.

A composition of oil and sulphur, mixed to the consistence of paint, will also prove highly advantageous, in expelling young insects from the trees infested by them.

But the most effectual remedy is, to wash the plants gently and frequently with pure water, and if the young shoots be much infected, to rub them gently with a woollen cloth, in order to clear away the glutinous matter. This operation should be performed in the morning, that the moisture may be exhaled before night.

It deserves to be mentioned, that the blights most destructive to fruit-trees, are those produced by the hoar frosts in spring mornings, which are often succeeded by warm sun-shine.

Blighted Corn. See SMUT.

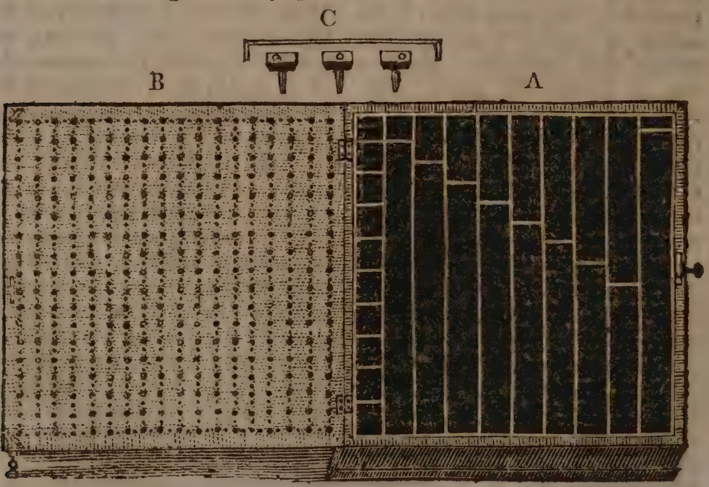
BLINDNESS, implies either a partial or total privation of sight, proceeding from some defect of the organs of vision, or an impaired state of their functions. Hence it may be either total, partial, transient, periodical, or nocturnal. The causes of blindness are likewise various, such as weakness, or decay of the optic nerves, preternatural conformation of the organs, external violence, malignant effluvia, poisonous liquids dropt into the eye, too frequent exposure to intense heat, long confinement in dark places, &c.

As we propose to treat of the principal diseases of the eye, under the heads of CATARACT, GUTTA-SERENA, and SIGHT, we shall here only observe, that those unfortunate persons who are born blind, or lose their sight in infancy, seldom recover that important faculty, and ought therefore to be educated for such pursuits as are adequate to their individual capacities. It is, indeed, equally cruel, and inconsistent with good policy, to suffer these pitiable beings frequently to spend a vagrant life, and remain in the darkest ignorance. On the contrary, it has been uniformly observed, that the privation of one sense renders the others comparatively more acute and useful. Hence blind persons generally hear better, and possess a more accurate sense of touch, than those who enjoy all their sensitive faculties; and we have also many instances of the poetical and philosophical talents displayed by the former.

With a view to contribute our share towards alleviating the severe lot of such unfortunate individuals, we shall here communicate an invention of Mr. THOMAS GRENVILLE, organist, of Ross, in Herefordshire; who, in the year 1770, received a premium of fifteen guineas; and, in 1785, for some additional improvements, the silver medal, from the Society for the Encouragement of Arts, &c. It is remarkable, that the ingenious inventor is himself deprived of sight; and that by the use of his machine, any blind person may be taught the elements of arithmetic, namely, addition, subtraction, multiplication, division, reduction, and the rule of three, whether in money, weights, or measures of every kind, as perfectly as it may be performed on paper. His apparatus being of a simple construction, and so contrived that it may be of service in teaching the art of reckoning, to young children, in a very easy and entertaining manner; we shall first give an account of this machine, as represented in the subjoined cut, and then conclude with a description of its mechanism.

It consists of a box nineteen inches square in the clear space within, and near two inches deep, divided into cells, containing the figures, lines, &c. hereafter described, necessary for performing the rules of arithmetic. The lid or cover of the box, which serves as a leaf, or slate, is pierced full of holes in parallel rows; the first row has eighteen large, and seventeen small holes, alternately placed; the second row, eighteen small holes, placed under the above large ones; the third, as the first, and so on alternately, thirty-five rows, the whole cover being full, and containing three hundred and twenty-four large holes, and six hundred and twelve small ones, which make an exact square. The figures are represented by pegs with cubical heads, and distinguished by pins placed on one side in the following manner:—One, is expressed by a pin's point on the right-hand; two, by the same in the middle; and three, by having it on the left-hand; four, five, and six, by pins' heads in the above three different situations; seven, eight, and nine, by crooked pins, or staples, in the same manner: the cypher is understood by a plain peg, without any mark. On the top of each peg is printed the figure which it represents, to render the work intelligible to any person that may see it, without being acquainted with the marks. These pegs are made to fit the large holes. Pieces of brass wire, bent to a right angle, about half an inch from each end, and made to fit the small holes, serve for the purpose of lines, to separate the different parts of the work.

The box contains twenty-eight partitions, situated as in the following cut, ten of them to hold figures, and the others for the lines of different lengths.



A, The box, with its several divisions, containing the different pegs, bars, &c. with which the rules in arithmetic are to be performed.—B, The cover, which, when turned back, and standing on its feet as represented, shews the holes wherein the pegs and bars are occasionally placed to exhibit the value of the figures.—C, The pegs, marked in such manner as to enable the blind person to distinguish by the touch, what each peg is intended to represent, when placed in the holes in the cover B.

A complete specimen of this machine may be seen in the Repository of the Society, Adelphi-buildings, London.

With respect to the education of the blind, we have already remarked, that it deserves public sympathy, and the interposition of the legislature; as their natural industry, and persevering application, will enable them to overcome the greatest difficulties, and amply repay the trouble and expence bestowed on their mechanical, or literary, acquirements. To strengthen their faculties, and preserve their health, *blind children* should never be suffered to remain idle, so that during the hours of recreation, they ought to take suitable exercise, such as riding on horseback, walking out in fair weather, the use of dumb-bells, the bath-chair, &c.—In regard to diet, their meals should be temperate, light, and of easy digestion. Vegetables the most farinaceous, and least acescent, should be preferred to animal food. Neither fermented liquors, nor ardent spirits, should be given them, except in cases of general debility. Tea is likewise pernicious; and their regular drink ought to consist of equal parts of milk and water: a little chocolate, and coffee, may occasionally be granted; but infusions of balm, sage, or ground-ivy, are more wholesome. Tobacco and snuff must be absolutely prohibited; and, on the whole, blind persons should neither be too much restricted to the observance of a rigid system of diet, nor allowed to eat and drink whatever is suggested by their own fancy: in the former case, they are apt to become pitiable slaves to custom; and, in the latter, it is a shameful dereliction of duty in those whom Providence has enabled to see, and direct their affairs.

Blindness, in farriery, is a disease incident to the eyes of horses, but more particularly to those of an iron grey, or dapple-grey, colour; and is supposed to proceed from riding them too hard, or backing them at too early an age. This disorder may be discovered by the walk or step, which, in a blind animal, is always uncertain and unequal, when led; but, if he be mounted by an expert horseman, an apprehension of the spur may induce him to move with more freedom, so that the blindness can scarcely be perceived. A horse may also be known to have lost his sight, if observed constantly to prick up his ears, and move them backwards and forwards, on hearing any person enter the stable.

The ordinary cause of blindness in horses, is attributed by Dr. Lower to a spongy excrescence growing in one, and sometimes in two or three places of the coloured part of the *iris*, or which being ultimately over-grown, covers the pupil when the horse is brought into the light, but again dilates on returning him to a dark stable.—See EYES of *Horses*.

BLIND-WORM *(fragilis)*, or slow-worm; a species of the *Anguis*, or snake. It is about a foot in length, and of the thickness of the little finger. Its name is derived from the slowness of its motion, and the smallness of its eyes. It is chiefly found in gardens and pastures.

The Rev. Mr. FOSTER, in his "*Observations on noxious Animals*," asserts, from his own experience, that the bite of this creature is perfectly harmless; and he mentions two cases in which it was not attended with any ill consequences. These observations are farther corroborated by a passage in the twenty-ninth volume of the Monthly Review, respecting a dog having been bitten by a slow-worm without any ill effects.

BLISTER, in medicine, signifies either a thin bladder, containing a watery humour raised on the skin, or the application of vesicatories to different parts of the body. With this intention, Spanish flies are most commonly employed; though we are possessed of a great variety of indigenous plants, which might be effectually substituted. Hence we recommend, from experience, the following: 1. Mustard-seed mixed with vinegar sufficient to convert it into a thick paste, to be spread upon linen; 2. The fresh root of the horse-radish, grated, or in fine shavings; 3. The bruised leaves of the different species of the *Ranunculus*, or crow-foot; 4. The leaves of the *Polygonum hydropiper*, or water-pepper, growing wild on the banks of rivulets; and 5. The most powerful of all indigenous vegetables, the *Daphne Mezereum*, or spurge olive, every part of which is extremely acrid, but the rind is preferably used for blisters. Whether fresh, or dried, this rind should be previously steeped for a few hours in strong vinegar, and then a piece about one inch broad, and two or three inches long, tied overnight to the part; after it has sufficiently drawn, the blistered place is covered with an ivy leaf; and a similar vesicatory is applied contiguous to the former. In this manner, it is continued, according to particular circumstances, especially in chronic diseases, till the desired effect is attained. Where no time is to be lost, we advise the use of mustard-seed, as before described, with the addition of a little salt, which greatly increases its efficacy. These cataplasms are often more proper than the blisters prepared with Spanish flies; because the former operate more speedily, and act with less violence on the fluids than the latter. Hence they are of eminent service to promote critical eruptions; to prevent the small-pox from breaking out on the face, when applied at the commencement of the disease, either to the calves of the legs, or the soles of the feet; to mitigate the pain arising from internal inflammations, to drive catarrhal and rheumatic humours from the more essential organs of life to the proximate external parts, and to rouse the indolent powers of Nature. In the most acute pains of the head, and the tooth-ach proceeding from a rheumatic cause, as well as in inflammatory affections of the eyes, such plasters may be usefully applied to the neck or the arm; in inflammations of the chest, to the breast and between the shoulders; in apoplectic fits, to the temples, &c.

In paralytic diseases, it is of the utmost consequence to place the blister in that direction which corresponds with the situation of the nerves in the part affected; and, in rheumatic disorders, such places should be preferred, as contain nerves connected with the painful part, immediately under the skin. Thus, in the most acute lumbago, or sciatica, it would be of little use to blister the hip or thigh, where the nerves are situated deep in the muscles; but by applying a vesicatory to the sole of the foot on the same side, we may promise almost certain relief.

In all inflammatory, and especially in nervous affections, attended with a small, feeble pulse, and where the powers of Nature are rapidly declining, the use of blisters is very extensive.

Their operation is in a great measure mechanical; as the first action is that of stimulating the vessels of the skin, inducing the blood to flow from the part most affected by inflammation, to the surface; thus exhausting the principle of irritability, and collecting the serum, or watery part of the vital fluid, under the cuticle.

We shall farther observe, that in acute and dangerous diseases, where it is often necessary to repeat the application of blisters, the new one should never be delayed till the former is completely healed. But, with respect to the time they are to be left on the skin, much depends on the degree of irritability in the patient, as well as the relative strength of the plaster. Some constitutions, of an irritable fibre, experience its effects in less than half an hour, while in others it may remain four, six, or eight hours, without raising the skin. In opening a blister, it is not necessary to cut away the epidermis, or scarf skin, and to cause unnecessary pain and irritation; as a single longitudinal incision is sufficient to give vent to the collected humour.

Blisters sometimes operate on the urinary canal, and produce a painful strangury, or difficulty of making urine: this effect may be remedied by the internal use of camphor, assisted by diluent and agglutinating emulsions, such as strong decoctions of barley, lintseed, solutions of gum arabic, &c.; and to prevent such accidents, the blister itself may be mixed with camphor. If, on the other hand, they will not draw, the skin ought to be previously rubbed with strong vinegar: or, if their action be too violent, a little of the extract of henbane may be added to the composition.

Caution. We think it our duty to warn the reader against the use of blisters, in which the *Spanish fly* is the principal ingredient. In plethoric persons, or those of a full habit, they increase the circulation of the blood; and ought to be applied only after the necessary evacuations have been strictly attended to. In diseases of a putrid tendency, such as low fevers, and bilious diarrhœas, they are pernicious, because they stimulate and spread the contagion over the whole frame. Lastly, when the humours are obviously in a state of dissolution, which is evident from the sallow and lifeless complexion of cachectic persons, blisters are not unfrequently productive of incurable mortification. These fatal effects, however, seldom or never take place from the application of mustard-seed, or horse-radish.

BLITE, the small red, or *Amaranthus blitum,* L. is an indigenous species of the amaranth, which is frequently found growing on rubbish, &c. It flowers in July and August: on the Continent its seed is used as a substitute for millet, and the leaves are dressed and eaten like spinach.

Blite, the upright. See round-leaved GOOSEFOOT.

BLOOD, the most copious fluid in the animal body, and essentially necessary to the preservation of life: it is generally of a red, but in most insects, and in all worms, of a white colour.

The human body is, by Dr. KEILL, supposed to contain at least one half of its weight in blood; including in this computation all that exists in the lymphatic ducts, nerves, or any other vessel. This computation, however, is exaggerated; and we believe that the greatest quantity in a full-grown adult, seldom exceeds thirty pounds weight. Its most remarkable property is that of incessantly circulating in the cavities of the heart, arteries, and veins, while the animal is alive. Although HIPPOCRATES appears to have possessed a faint idea of this admirable process, when he says, "that all the blood vessels spring from one; and that this one has neither beginning nor end; for where there is a circle, there can be no beginning;" yet as he was not acquainted with the office of the valves, he could neither comprehend, nor demonstrate, the circulation of the blood. This most important of all discoveries in physiology, was reserved for the immortal HARVEY, who first ascertained the true nature and uses of the valves, and about the year 1616, taught, in his Lectures at Cambridge, that justly admired doctrine, the substance of which he published in 1628. He proved that, in most animals, the blood circulates in arteries and veins, and through the medium of one, two, or more hearts (see ANIMAL KINGDOM); that in arteries it moves from the trunk to the branches; and that, meeting there with the branches of veins, it returns in a languid state to the heart; that the heart communicates a new impulse, and propels it to the trunk of the arteries; and that by these, the thickness of their coats, exerting muscular force, again drive it into the veins.—Valves are situated in every part of this circulating course, in order to prevent the return of the blood.

The colour of this fluid in the arteries is of a florid hue; but somewhat darker in the veins, except in those of the lungs, in which it is of a lighter cast. When exposed to the open air, the blood gradually separates into two parts, namely, the *serum,* or a yellowish, sometimes greenish fluid, and the *crassamentum,* or cake, which resembles a red mass swimming distinctly on the top. The latter contracts greatly in its dimensions, and increases in solidity; properties which depend on the state of the individual at the time when the blood is drawn. Hence, in vigorous persons, when attacked with an inflammatory disease, the solid part is so tough that it resembles a piece of flesh, and has therefore been called the *buffy coat*; whereas, in other diseases, it is very soft and tender, breaking in pieces on the slightest touch. By chemical analysis, it discovers the same principles with other animal substances;

yielding in distillation a volatile spirit, a great quantity of phlegm, and fetid oil; lastly, there remains a charred matter, which, when burnt in the open air, leaves a white earth similar to calcined hartshorn. According to some chemists, however, it contains both an acid and an alkali. But the most remarkable circumstance in the blood, is its texture, which consists of millions of red globular particles, or more properly, as Mr. HEWSON calls them, flat vesicles, each of which has a little solid sphere in its centre. He observes, that they are flat in all animals, of very different sizes in different creatures, and impart to the blood its red colour. In man, they are small, perfectly flat, and appear to have a dark spot in the middle. To see them distinctly, he diluted the blood with fresh serum. Their shape he supposed to be of great importance, but it can be altered with a mixture of different fluids. By a determinate quantity of neutral salt contained in the serum, this fluid is adapted to preserve those vesicles in their flat shape; for, if mixed with water, they become round, and dissolve perfectly, but on adding a little of any neutral salt to the water, they remain in it without dissolving, or any alteration of their form.

The uses of the blood in the animal economy are so various and important, that some have not scrupled to maintain that it is possessed of a vital principle, from which the life of the whole body is derived. This opinion was formerly entertained by HARVEY, and has lately been revived and supported, with many ingenious, though inconclusive, arguments, by JOHN HUNTER. Yet so much is certain, that the blood stimulates the cavities of the heart and vessels to contract, that its circulation contributes to generate the heat of the body, and propagate it to the remotest parts; in short, that it nourishes every part, and supplies all the secretions, which, without exception, are separated from the blood. Hence it forms the bones, ligaments, tendons, membranes, muscles, nerves, vessels, and the whole organized body.

The blood is of different degrees of viscidity in different animals, and even in the same creature, at different times. It always possesses a considerable degree of tenacity; which, however, is remarkably greater in strong than in weak animals: thus, the blood of bulls was used by the ancients as a poison, on account of its extreme viscidity, which renders it totally indigestible by the human stomach.

Animal blood was formerly held in great esteem, as a medicine in various diseases; for instance, the blood of goats and some other creatures was employed by the followers of GALEN, and recommended even by the late Dr. MEAD in pleuritic attacks. But at present the principal use of blood is confined to the arts, for making Prussian blue; sometimes for clarifying certain liquors; and very large quantities are used in the manufacture of loaf sugar. In horticulture, it is recommended as an excellent manure, when poured in spring on the roots of fruit-trees, having previously removed the soil round the trunk: thus employed, it promotes the growth of the tree, and enriches its fruit. A mixture of blood with quick-lime, forms an exceedingly strong cement, and has therefore been used in preparing chemical lutes, as well as in making the floors

floors of common farm-houses, and other humble habitations. For the latter purpose, a mixture of clay, ox-blood, and a moderate portion of sharp sand, beaten well together and uniformly spread, produce a neat, firm floor, and of a beautiful colour.

Whether blood really affords *nourishment*, has been doubted by some, and affirmed by others. In our opinion, it contains little or no alimentary matter; and though it may be digested by very powerful stomachs, it might be more advantageously employed in manuring the soil. In hot climates in particular, it is highly alkalescent, and was therefore wisely prohibited to the Israelites. When blood was used as a common article of food in this country, the scurvy not only prevailed more generally than at present, but it was a more violent and obstinate disease.

Travellers inform us, that in some countries the savage natives are accustomed to intoxicate themselves by drinking the *warm* blood of animals. This barbarous practice, with its consequent effect, apparently confirms JOHN HUNTER's opinion, that this fluid is the immediate reservoir of the vital principle; and the inebriating quality of the blood certainly deserves the farther researches of the chemical philosopher. Several expressions in Scripture also tend to countenance the conjecture of this acute inquirer.—See TRANSFUSION.

BLOOD-HOUND, *Sanguinarius*, a species of dog remarkable for possessing the sense of smelling in the highest degree. This animal is distinguished by his long, smooth, and pendent ears, broad chest, muscular form, a deep tan colour, and is generally marked with a black spot above each eye. We believe the breeding of this species has of late years been neglected.

These animals were formerly much employed in the discovering of game that had escaped, or been stolen out of the forest. From the acuteness of their smell, they are said to have also been able to trace the footsteps of man with the greatest certainty; hence, they were trained for discovering delinquents who endeavoured to escape the hands of justice.

Dogs of this species were once greatly esteemed on the confines of England and Scotland, and employed to prevent, or detect, the depredations which the inhabitants were continually committing on each other.

BLOOD-SHOT EYES, an inflammation of the membranes which invest the eye. As we propose to treat of the diseases incident to that organ, in general, under its alphabetical head, we shall at present only state the first and most necessary rules for preventing the progress of inflammatory complaints; namely, rest, and exclusion of light, without heating the eye by a close cover; cold fomentations repeatedly applied, when they become warm; abstinence from animal food, and all heating or stimulating liquors; mild aperients; and, if these do not produce the desired effect, leeches may be applied, near the eyes; though drawing blood, by cupping and scarifying near the temples, has generally been found more effectual.

BLOOD-SPAVIN, in farriery, is a swelling and dilatation that runs along the inside of the horse's leg, forming a small, soft tumor in the hollow part, and is not unfrequently accompanied with weakness and lameness of the part affected.

The cure of this disorder should at first be attempted with restringents and bandages, which will be found very efficacious in strengthening the joints; but if these should fail in reducing the vein to its natural size, the skin must be opened, and the vein tied with waxed thread passed under it with a crooked needle, both above and below the swelling, and the turgid part suffered to digest away with the ligatures: for this purpose, the wound should be daily dressed with a mixture of turpentine, honey, and spirit of wine.

BLOOD-STONE, or Hematites, is a hard mineral substance of a red or purple colour. It is found in masses of different forms, and contains a considerable portion of iron, insomuch, that forty pounds of that metal have been extracted from a quintal of the stone. The iron is of a very inferior quality, and therefore seldom used; but the blood-stone itself, on account of its hardness, serves to burnish or polish metals.

Dragon's Blood. See DRAGON.

BLOOD-LETTING, in surgery, is performed with a view either to diminish the quantity of the circulating fluid, or to relieve a particular part, in case of inflammation, and, consequently, it is either general or local.

General blood-letting, is that which is performed upon a vein or an artery: hence we have the terms *phlebotomy* and *arteriotomy*.

Local, or topical blood-letting, is performed by scarification and cupping-glasses, by leeches, or by punctures made with a lancet, according to the nature of the disorder. This latter, or topical blood-letting, is never dangerous, but in many cases has been found effectual in relieving the patient. With respect to venesection, however, as different opinions are entertained of its utility by different physicians, it may not be improper to offer a few remarks.

There was a period, during which blood-letting was in very general use, and obtained great credit, as one of the most effectual means of prolonging life; while a *plethoric habit* was supposed to be a principal cause of early dissolution. Through the veins thus regularly opened, at certain seasons, the superfluous or vitiated blood was emitted, while that of a more salubrious quality was supposed to be left behind. It is now well known, however, that the corrupted part of the blood cannot be separated from the mass, so as to preserve the remaining particles sound and uncorrupted. If the quality of the blood ever become vitiated and diseased; if it be too thick and viscous, or too acrid and serous, the whole mass necessarily participates in the infection; neither is it in the power of art to contrive any method, by which the corrupted part may be separated from that which is in a sound state. It would be equally unreasonable to expect, that a spoiled cask of wine could be cured of its tartness, by attempting to draw the acid and impure portion from the top, in order to leave the sweet and wholesome part behind.

Considered as a remedy, phlebotomy must certainly be allowed to possess its uses; it is sometimes a necessary expedient, to produce an immediate diminution of the fulness of the blood, particularly when the time is too short, and the danger too pressing, to admit of any other method for effecting that purpose. As there can be no doubt, that blood-letting is an invaluable remedy in some disorders, it is the more peculiarly incumbent on the practitioner, to distinguish with care those cases in which imminent danger may be averted, and health restored by the use of it. There are two cases, and perhaps only two, in which venesection is likely to be attended with real advantage; 1. When it is required to prevent the fluids from gaining access to the parts more essential to life; and 2. Where means must be speedily used to counteract a threatened inflammation in the intestines. But even in those two cases, the intelligent physician is at no loss for other remedies, which may be frequently administered with greater safety and equal success.

The blood contains in itself, and affords to the vessels, nerves, muscles, membranes, tendons, ligaments, bones, in short, to the whole organized body, all the substance and properties which enter into the formation of each, and constitute them what they are. Each of these parts is evolved from the blood, and adapted to its proper place, in so wonderful a manner, that the human mind is totally at a loss to comprehend how this operation is performed; neither have the researches of the most acute and attentive observer been able to account for it. And as the blood serves to supply the waste, and to make up the losses, which those parts occasionally sustain, it may be considered as the original source of our whole organization. Now it requires little reflection to perceive, that by wasting this vital fluid, the sources of animal support and regeneration are in a great measure obstructed and diminished. Although it be true, that the blood lost by periodical bleedings is soon reproduced by the activity of the vital powers, yet this restoration is not effected without considerable efforts, and at the expence of the whole machine. As this exertion, therefore, is a great pressure upon the vital powers, it must of course be attended with a proportionate degree of their consumption. And experience has shewn in numberless instances, that persons accustomed to frequent blood-letting are not only rendered more delicate in their constitutions, and more subject to diseases, but also that they die in general at an earlier age than others.

The absurd notion, that bleeding is useful and necessary to the prolongation of human life, is still pretty generally received among the common people of all countries. Yet neither the *good* nor the *bad* days, superstitiously marked in the almanacks for the amusement of the vulgar, can palliate or justify the mischief with which this dangerous error is pregnant: for bleeding can only be of service in some urgent cases, and when performed at the proper time: but to the healthy it is always injurious.

Blood-letting, in *farriery*, an operation often undertaken when it is as useless and pernicious as in the human species. Such horses, however, as stand much in stable, and are full fed, occasionally require bleeding, especially when their eyes are heavy and inflamed; or when they feel unusually hot, and champ their hay.

Young horses should be bled

when they are shedding their teeth, as it allays those feverish heats to which they are subject at that period; but the cases that more particularly require bleeding, are colds, falls, injuries of the eyes, strains, and all inflammatory disorders.

These noble creatures should always be bled by measure; two or three quarts are generally a sufficient quantity; and when venesection is repeated, strict attention should be paid both to the disease and constitution of the animal.

BLOOD-VESSELS, in anatomy, are long membranous canals, which convey the blood through every part of the body. They are divided into two classes, arteries and veins. For an account of the construction, situation, and uses of the former, see ARTERY.

The *veins* originate from the extremities of the arteries, and return the blood from them into the auricles of the heart, which is the common termination of all the veins. Like the arteries, the veins are also composed of three membranes, but more delicate than those of the former, and nearly transparent; they are divided into trunks, branches, ramuli, &c. In general, the veins are situated by the sides of the arteries, but more superficially; and as they proceed towards the heart, they gradually become larger. As the veins do not pulsate, the blood, which they receive from the arteries, is urged forward partly by the contractility of their coats, partly by the pressure of the blood from the arteries, and partly by respiration. They are moreover furnished with valves, which prevent the return of the blood.—See BLOOD.

BLOODWORT, the Small-grained Dock, or the *Rumex sanguineus*, L. is a plant seldom cultivated, as it so quickly propagates that it becomes a troublesome weed. See WITHERING, 353.

The fresh leaves and stalks of this vegetable afford a juice of a dusky blood-red colour; which, after standing for a short time, changes to a dark blue or violet tint: and if prepared with alum, it might probably be used in dyeing. This juice, when laid over other colours in painting, imparts to them an additional lustre, and may be used, if properly mixed, either as a red or blue colour.

Bloody Flux. See DYSENTERY.

BLOSSOM, in general, signifies the flowers of plants. See FLOWER. It is also applied to the flowering of trees in the spring, called their bloom. The use of the blossom to the vegetable is, partly to protect, and partly to draw nourishment for the embryo fruit or seed.

Blossom is also a term applied to a horse, whose general colour is white, but interspersed with sorrel and bay hairs. Such horses are so insensible, and hard both in the mouth and flank, that they are scarcely of any value; and are likewise very liable to turn blind.

BLOW-PIPE, in chemistry and mineralogy, an instrument by which the breath may be directed in a stream upon the flame of a lamp, or candle, in order to vitrify a small quantity of mineral substance. The process of assaying in the dry way, may readily be performed in the same manner.

Most of the experiments which can be made by means of a large apparatus, may also be accomplished by the blow-pipe, in a much shorter space of time, while even the smallest particle of the matter is sufficient. "The first inquiry to be made," says M. Bergmann, "is, *what* a substance contains, not *how much*." Experiments with the blow-pipe have this advantage over those conducted in crucibles, that we can distinctly see all the phenomena from beginning to end; by which means we obtain an illustration of the series of operations and their causes.

BLOWING, an agitation of the air by means of a pair of bellows, the mouth, &c. Butchers have a very pernicious custom of blowing meat, to deceive the buyer. The sudden change of veal and lamb in particular may, in some degree, be attributed to this cause. It is also a common practice to blow poultry, and all sorts of fish, except those of the shell kind. The method of blowing fish, especially cod and whiting, is, by placing the end of a quill, or a tobacco-pipe, at the vent, and making a hole with a pin under the fin which is next the gill; consequently the fish appears large and full, but when dressed will be flabby, and little else but skin and bones. By placing the thumb on each side of the vent, and pressing it hard, the air may be perceived to escape, and this imposition be detected.

As the venders of provisions, who are guilty of such disgusting practices, may at the same time be infected with the most loathsome diseases, the articles thus polluted should be rejected as being unfit for consumption. Indeed, the pernicious tendency of blowing meat is obvious, and ought therefore to be discouraged by every class of purchasers, while it claims the serious and vigorous interference of the public magistrate.

Blowing, in botany, is the gradual and perfect expansion of flowers.

Blowing of Glass, is performed by dipping the end of an iron blow-pipe into melted glass, and blowing into it. See Glass.

BLUBBER, the fat of the whale and other aquatic animals. It lies immediately under the skin. In the porpoise it is firm, fibrous, and about an inch thick; in the whale, it is commonly six inches in thickness. Formerly, the blubber was boiled down into train-oil on the shores of Greenland, and other places, where the whales were caught; but it is now brought home in casks, and undergoes that process in Britain. The quantity of blubber yielded by a whale is forty, fifty, nay sometimes, eighty hundred weight.

BLUE, is one of the seven colours of Nature, into which the rays of light divide themselves when refracted through a prism. The principal blues used in painting are, Prussian blue, bice, Saunders' blue, azure or smalt, verditer, &c.; for the preparation of which, see Colour-making. In dyeing, the principal ingredients which afford a blue colour, are indigo and woad. —See also Dyeing.

The *Dutch blue*, commonly called Turnsol, may be prepared by the following process: The kind of lichen called Arabic, or, in default of it, the large oak moss, being dried and cleansed, ought to be reduced to a powder, and by the assistance of a press, forced through a sieve, the holes of which should be small. This powder should be then mixed in a trough with an alkali called vetas, or the ashes of wine lees, in the proportion of one-third ashes, and two-thirds lees. This composition being moistened with human urine, a fermentation is excited, and a due degree of moisture preserved by the addition of the same liquor. When it assumes a red colour, it should be removed into another vessel, again moistened with urine, and stirred, to renew the fermentation. In a few days the blue colour will begin to appear, and it must then be carefully mixed with a third part of pure powder of pot-ash; after which it should be removed into wooden pails, three feet high and six inches broad. As soon as the third fermentation begins, it ought to be mixed with pulverized chalk or marble. The last gives no addition but in weight.

A fine blue colour, equal to ultramarine, may be made by collecting the blue corn-bottle flower, or *Centaurea cyanus*, which abounds in almost every corn-field: it has two blue tints; the one pale in the larger outward leaves, the other deeper, which lies in the middle of the flower; by rubbing the last, while fresh, so as to express the juice, it will yield a beautiful and unfading colour.

On the same day that the flower is gathered, the middle should be separated from the extremities, and when a quantity of the juice is obtained, a small addition of alum will produce a permanent, clear blue, which, in the opinion of many persons, is not inferior to ultramarine.

Blue John, among miners, is a kind of mineral which has lately been fabricated into vases and other ornamental articles. It is of the same quality as the cubical spar. At the foot of the high mountain called *Mam-Tor*, at Castleton, in Derbyshire, it is still found in large pieces, which are sold for about nine pounds per ton.

BLUE-BOTTLE (Corn), or the *Centaurea cyanus*, L. is a plant common in corn-fields. See WITHERING, 472; and *Engl. Bot.* 277. This vegetable is considered as a weed; but besides the property of affording a valuable paint, as mentioned in the preceding article, it is also much frequented by bees. A decoction of the flowers with galls and copperas, affords a good writing-ink; and it may also be employed with success in the dyeing of linen or cotton.

BLUEING, is the art of communicating a blue colour to different kinds of substances. Laundresses blue their linen with smalt; dyers, their stuffs and wools with woad or indigo.

Blueing of metals is performed by heating them in the fire till they assume a blue colour; it is particularly practised by gilders, who blue their metals before they apply the gold and silver leaf.

Blueing of iron, is a method of beautifying that metal for mourning buckles, swords, &c. The process is as follows: Take a piece of grind-stone or whet-stone, and rub hard on the work, to take from it the black scurf; then heat it in the fire, and as it grows hot, the colour changes by degrees, appearing first of a light, then of a darker gold colour, and lastly of a blue. Sometimes they also grind indigo and salad-oil together; and rub the mixture on the work, while it is heating, with a woollen rag, leaving it to cool gradually.

BOARD, a piece of timber sawed thin, for building, and other purposes.

A cheap and durable composition for preserving *weather-boarding*, may be made in the following manner:—Take three parts of air-slacked lime, two of wood-ashes, and one of fine sand, or sea-coal ashes. Sift these through a fine sieve, and let them be well mixed: then add as much lintseed oil as will bring the whole into a consistence fit for working with a painter's brush. At first, give the weather-boarding a thin coat of this mixture; and when that is dry, give it a second, as thick as can be conveniently worked. This composition is cheaper and more durable than paint: it is also impenetrable to water, and not liable to be injured by the action of the weather, or the heat of the sun.

BOAT, a small open vessel worked by oars or sails. The formation and names of boats are different, according to the purposes for which they are intended: hence they are slight or strong, with a keel, or flat-bottom, open, half, or whole decked, and plain or ornamented.

M. Bernieres invented a boat which is not liable to be overset or sunk. Some trials were made with this vessel, at Paris, in the year 1777, in the presence of a vast concourse of spectators. Eight men went into the boat, and rocked it till it filled with water, and afterwards rowed it along the river in that state, without danger of sinking. M. Bernieres then ordered a mast to be erected in the same boat, when filled with water, and hauled down by a rope fastened to the top of the mast, till it touched the surface of the river, so that the vessel heeled in a position to which neither winds nor waves could bring her; yet as soon as the rope was let go, the boat recovered her equipoise in less than a second. This experiment proved that the boat could neither be sunk nor overturned, and that it afforded the greatest possible security against accidents. Hence this invention is of the first importance to the inhabitants of maritime states.

In the year 1785, a patent was granted to Mr. Lukin, for his improvement in the construction of boats and small vessels, so that they will neither overset nor sink. This useful invention is described in the specification of the patent, as follows: To the outsides of boats and vessels, of the common or any other form, are projecting gunwales, sloping from the top of the common gunwale, in a faint curve, towards the water, so as not to interrupt the oars in rowing; and, from the extreme projection (which may be greater or less, according to the size and use the boat or vessel is intended for), returning to the side in a slight curve, at a proper distance above the water-line. These projecting gunwales may be made solid, of any light materials, that will repel the water, or hollow and water-tight, or of cork, and covered with thin wood, canvas, leather, tin, or any other light metal, mixture, or composition. These projections are very small at the stem and stern, and increase gradually to the dimensions required; they will effectually prevent the boat or vessel from being overset by sudden squalls, or violent gales of wind, either in sailing or rowing, or by imprudent or unskilful management. In the inside at the stem and stern, and at the sides (where the projecting gunwales are not necessary), and under the seats and thwarts, are inclosures, or bulk-heads, made water-

Perspective View.

Fig. 1.

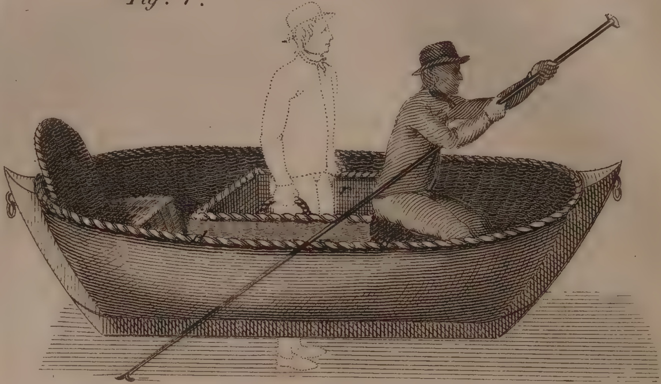


Fig. 2.

Plan.

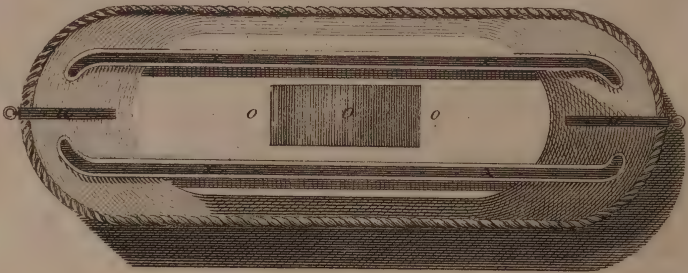
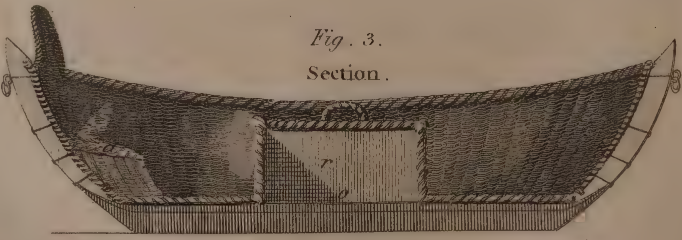
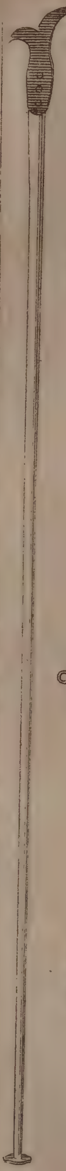


Fig. 3.

Section.





ICE BOAT,

Newly invented by Thomas Ritzler of Hamburgh.

water-tight, or filled with cork, or other light materials that will repel the water: the spaces between the timbers may in like manner be filled up. By this means, the boat or vessel will be so much lighter than the body of water it must displace in sinking, that it will with safety carry more than its common burthen, though the remaining space should by any accident be filled with water. Under the bottom, along the centre of the keel, is affixed a false one of cast iron, or other metal; this will strengthen and protect the bottom from injury in many cases; and, by being placed so much below the surface of the water, will act as ballast with more power than a much greater weight in the common situation, and is much more safe, by being fixed in the proper place, and not liable to shift by any sudden motion of the boat or vessel.

ICE-BOATS, a modern invention of Thomas Ritzler, of Hamburgh, whose name deserves to be transmitted to posterity; as his ingenious and useful contrivance has already saved many valuable lives from a watery grave. We have given an accurate representation of such a boat, with our First Number, and shall here furnish the reader with the description.

Fig. 1, Is a perspective view of the boat, the body of which consists of wicker-work covered with leather, to render it impermeable by water; and so remarkably light, that it may be easily managed by one person, both on the ice and in the water. Its length, when measured on the outside, is 7½ feet in the keel, and 12 feet above from end to end: its breadth, 3 feet at the bottom, and 4 at the upper part.

Fig. 2, Represents the plan of the boat, the bottom of which is shod with two small pieces of iron, marked *x*, *x*: by means of two hooks, one of which is delineated on the plate, the boat may with the greatest facility be slided over the ice. In the lower part, or body, of the vessel, there is a large opening, 3 feet long, and 15 inches wide, pointed out by *o*, *o*, *o*, fig. 2; and *o*, fig. 3; the four sides of which are secured by a frame-work, marked *r*, fig. 1, and 3, to prevent the water from entering the vessel. Through this opening, also, the boatman is enabled to step upon the ice in those places where it is too uneven to admit the sliding of the boat, and to carry it, by means of the handles, as represented in fig. 1, where the person standing, is marked only with dotted lines, to shew that he has quitted his former station in the boat. Another advantage derived from this aperture, in the middle of the boat, is the counterpoise which a column of water in its centre produces, and thus prevents it from being overset, while the man who carried it over the ice, immediately raises himself above the level of the water, and sits down in the vessel. But, in order to approach nearer to the person whose life is endangered, there is also employed a ladder with a long jointed handle, which is pushed forward and held by another assistant standing on the firm ice. On this ladder (which will be delineated among the implements of restoration from Drowning) the boatman places himself, and advances as near as possible to the body immersed in the water. Having successfully extracted it, no time should be lost in laying it in a proper posture in the boat; for which purpose there is a kind of chair with an elevated back, on the stern of the boat, marked *n*, in fig. 1, and 3; which last exhibits the longitudinal section of the vessel.

M. Gunther, one of the most active members of the Hamburgh Society for the Encouragement of the Arts and useful Trades, informs us in the third volume of their Transactions, published in 1795, that he has often been present when unfortunate persons have been rescued from untimely death, by means of the ice-boat, and that the swiftness and dexterity with which this machine may be managed by expert assistants, is almost incredible. Hence the vessel is not intrusted to any other but skilful hands, and during summer it is deposited in an airy place, and the leather preserved from becoming either too dry or mouldy. The whole of this useful apparatus costs only 150 marks currency, or about 10l. sterling; a sum so insignificant, that, while the city of Hamburgh has built five such ice-boats, the great city of London ought to be in possession of at least one hundred.

LIFE-BOAT, at Shields, one of the most useful modern inventions, by which many lives and much property have already been saved. It was built by Mr. Greathead, an eminent ship-builder, and generously presented to the inhabitants of South Shields by the present Duke of Northumberland, by whose beneficence North Shields has also been supplied with a boat of a similar construction.

Mr. Fairless, who furnished some useful hints respecting the original plan, describes the vessel as measuring thirty feet by ten, resembling in form a common Greenland boat, but more flat in the bottom. The quantity of cork employed in the construction is about seven hundred weight, with which the boat is lined, inside as well as outside of the gunwales, two feet in breadth; the seats being also filled with the same material. It is rowed by ten men, double banked, and steered by one at each end with oars, being alike in its form at both ends, and contrived so as not to sink in the sand.

This boat draws very little water, and can carry twenty persons, even when full of water. Being water-proof, and rendered buoyant by cork, it always keeps afloat, preserving its equilibrium without danger of oversetting, and is able to contend against the most tremendous sea, having never failed, in a single instance, of conveying a distressed ship's crew in safety.

When taken out in the highest seas and broken water, the men testify no apprehension; and though cork-jackets were at first provided for them, yet their confidence in the boat is so great, that they now refuse them.

A model of this useful boat is kept at Northumberland-house, in the Strand. It might be improved, by providing it with wheels, for its more ready conveyance to the place where it is immediately wanted.

The vessel, when complete and copper-nailed, costs about 150l.— But in the moment of distress, what shipwrecked mariner would not think this article a cheap purchase, and pronounce the value of such a boat to be truly inestimable.

A patent has lately been granted to Mr. Edward Steers, of the

Inner Temple, for a machine to be applied to boats and other vessels, for the purpose of moving them with ease and swiftness. This invention consists of two or more paddles, moving by means of machinery, in contrary and alternate directions. The paddles are so constructed, that when the machinery is set in motion, the broad surface of one or more of them will press against the water, while the broad surface of the other, or others, will give way to it, and by this means the vessel will be moved.

BOBBING, among fishermen, a particular manner of catching eels. A number of large lobs are scoured and put upon twisted silk by a needle, which is passed through them from end to end. When a sufficient number is prepared, they are fastened to a cord, to which is fixed a plummet, so that they may hang in divisions. This cord is tied to a strong pole. With such a bait they fish in muddy water, and when they perceive that the eels have swallowed it, they gently draw them ashore.

BODY, in physics, implies an extended, solid, divisible substance, which in itself has no power of motion, but acts by external impulse; it also possesses the properties of attraction and repulsion. Whatever relates to this branch of knowledge, under its various modifications and appearances, through the whole creation, is the subject of physics, or natural philosophy: if it concern the economy of the human body, in particular, and the treatment of its various disorders, it belongs to the province of medicine, or the department of the physician. In this sense, therefore, the term *body* is used, in opposition to *soul*, and forms the subject of anatomical research.

There subsists a very close, and, during life, indissoluble connection, between the body and soul; insomuch, that the one partakes of the enjoyments and sufferings of the other. Whatever tends to impart a proper tone and vigour to the body, that is, every impression which is most likely to soothe and harmonize the passions, at the same time contributes to regulate the powers of the understanding, and gives them their due force and energy. Hence, temperate gratifications, as they are highly conducive to these ends, promote the harmony of virtue; for, by contributing to the health and sprightliness of the body, they invigorate the powers of the mind, and check the violence of the passions.

The human body is a machine so artificially and admirably organized for withstanding the various impressions of external agency, or the sudden vicissitudes of heat and cold, dryness and moisture, as well as for performing its various functions, that it bears evident marks of a wise and omnipotent Creator. It is composed of fluids and solids: the principal of the former are, the blood, chyle, saliva, bile, and the gastric liquor; of which the three last mentioned materially promote the digestion of food: the chief of the solids are the bones and cartilages, which give firmness and attitude to the body.

It would lead us too far from the plan of this work, to enter into particulars respecting the complicated and wonderful structure of the human frame: we shall, therefore, only observe, that it ceases to grow in height when the bones

bones arrive at a certain degree of firmness and rigidity, which will not admit of farther extension by the motion of the blood. This period appears to take place between the age of eighteen and twenty-four; but in females, often one or two years earlier than in males. Lastly, it is remarkable, that the height or length of the human body varies at different parts of the day: thus, in the morning, after a long and refreshing sleep, an adult will be found one inch taller than he was in the preceding evening.

BOG, a quagmire covered with grass, but not firm enough to support a heavy body.

Various theories have been started, to account for the formation of bogs; but the most probable is, that they have originated from the roots of trees, and other decayed vegetables. Under some bogs of considerable depth, are to be seen the furrows of land once ploughed. The black bog is a solid, weighty substance, which cuts like butter, and is similar to rotten wood: but the red bog is of a lighter texture, though under it there is commonly a solid black stratum, which makes good fuel. Sound trees are found in both sorts of bogs, particularly in those of Ireland, which differ from the English, as the former sometimes present a perfect scenery of hill and dale, while the latter are mostly of a level surface. Of the most common spontaneous growth are, heath, bog-myrtle, rushes, and sedgy grass. Bogs are of various depths, some being found to be fifty feet deep, and others still deeper. A good method of draining boggy lands is, by deep trenches partly filled with stones, and covered with thorns and straw. A quantity of hard, dry earths, such as gravels, sands, chalks, stones, &c. is of great use in the improvement of bogs, as these substances serve to bind, fatten, and warm the soil, while they prevent springs from oozing up and overflowing the surface. By this method, boggy or marshy grounds may be improved so as to produce good grass.

BOHEA, a species of tea which is generally used for breakfast, with or without milk. It was formerly supposed, that infusions of this herb would sensibly satisfy the cravings of hunger, and afford a balsamic nutriment; for which reason they were highly recommended in decays and inward ulcerations, especially those of the lungs. But such virtues are no longer attributed to these, or any other tea-leaves: on the contrary, it is now generally understood, that all warm or hot liquors, and tea in particular, have a direct tendency to weaken the organs of digestion, and consequently to impair the appetite for food. From this circumstance, we apprehend, it has erroneously been inferred, that such beverage is nourishing.—See TEA.

BOILERS. Many ingenious vessels and utensils have, at different periods, been invented, with a view to facilitate the process of boiling, and save the consumption of fuel. In the latter respect, Count RUMFORD stands at the head of those experimental inquirers, who have directed their labours to the benefit of society; yet we must confess that there is still great room for improvement. One of the latest inventions in this department of domestic economy, is that of Mr. THO. ROWNTREE, engine-maker, of Great Surrey-street, Blackfriars-road, who in 1798 obtained a Patent for "a new method of applying fire for the purpose of heating boilers and other vessels, where heat is required." But as the Patentee had not given a clear specification, from which an ordinary tradesman could have constructed a furnace on his principles, without any farther explanation, his Patent was declared void, after a trial before Lord ELDON and a special jury, on the 3d of November last, and has consequently become public property. These proceedings, however, have been attended with a good effect, as the obscure account published by Mr. ROWNTREE, has been more clearly defined by the evidence given in Court, especially by that of Mr. HINDMARSH. We shall, therefore, present our readers with the specification communicated by the Patentee, and accompany it with the necessary illustrations.—The following is a literal abstract of the inventor's description:—"For heating of coppers, boilers, furnaces, ovens, and stoves, my fire-place is much smaller than heretofore made use of for the same sized copper, boiler, furnace, oven, or stove. Instead of placing my fire-place, according to the common practice, immediately under the boiler, or other vessel, I place it at the front, side, or end, as I see most convenient, in such a manner as to oblige the flame to rise in the front, side or end, and pass all round the vessel, &c. while at the same time it strikes the bottom of the vessel, &c. without suffering the flame to pass off in a flue, or flues, as it usually does in the common way, and by that means sending the heat into the flues, instead of its being used where it ought to be, namely, on the vessels, &c.; this, my method effectually prevents; for, by means of a small perpendicular, or other opening, into a box or trap, which I call a reservoir, and which I place horizontally, or diagonally, as the situation may require, and is made of iron, brick, stone, or any other material capable of bearing heat, where a valve is placed riding on centres or otherwise, and standing in a diagonal or other direction, as is found most convenient, the flame is returned or impeded in its progress to the chimney, and made to descend below the bottom of the vessel, and pass out at the bottom, top, or side of said box, trap, or reservoir, into the common chimney. This reservoir is placed between the vessel, &c. and the chimney. To the opening, which admits the flame into the reservoir, are affixed, when necessary, sliders, registers, or stops, which serve to increase or diminish the heat. The valve in the reservoir is for the same purpose in another degree, which more immediately appertains to increasing or diminishing the draught, which it does by moving the said valve into different positions, as the speed of the operation may require."

It would be needless to state the particulars of the evidence relative to the effect produced by the new invented furnaces, in heating boilers, &c. as well as the great saving of fuel, which was proved to be more than *one-third*, and in some cases nearly *one-half*, of what is usually consumed in furnaces constructed on the old plan. Hence we shall communicate only the substance of Mr. HINDMARSH's evidence, which greatly tends to illustrate the principles of the invention,

vention. This, he conceives, principally consists in the three following circumstances:

1. In the peculiar mode of constructing the furnace, or setting the boiler, and of placing the fire, not immediately under, but a little in front, or at one side of it, whereby the flame and hot air can get access to every part of the vessel, and not only strike with force against its bottom, but also with equal effect reverberate against, and violently embrace its sides, and whole external surface; unlike every former contrivance, the most perfect of which could only cause the flame and hot air to act partially upon the bottom and sides of the vessel.

2. In the elevated situation, and smallness, of the aperture leading from the furnace towards the chimney; whereby the flame and hot air are impeded in their progress to the atmosphere, and compelled to tarry in the cavity of the furnace, and occupy every part thereof much longer than they otherwise would do. This effect in stopping, checking, and as it were arresting the flame and hot air, in their attempt to escape into the atmosphere, Mr. HINDMARSH considered as not only new, but singularly beneficial; for, by this means, the flame and hot air are detained in the very place where their presence is most wanted, and constrained to give forth their energies with an *impetus* against the bottom and sides of the vessel to be heated: whereas, in none of the furnaces heretofore erected, was any effectual stop interposed between the fire and the chimney, to cause the flame and hot air to dwell under and round the sides of the vessel; but they passed rapidly off into the atmosphere, either by a direct communication through the chimney, or indirectly, but almost as speedily, by flues; or else by a drain (as it is called), the aperture of which is equal in dimensions to that of the chimney itself.

3. In an open space between the furnace and chimney, called by the Patentee a box, trap, or reservoir, and intended as a receptacle of the flame, hot air, and smoke, after they have quitted the furnace, and passed through the small aperture as above described. This space, or reservoir, for the flame, hot air, and smoke, being closed at the top and external sides, and open only at the bottom outwards, for the purpose of permitting the smoke, &c. to pass off into the chimney, still farther checks and detains the flame and hot air in the furnace; and being itself constantly full of warm air, smoke, &c. causes the heat to be reverberated against the sides and bottom of the vessel or boiler, and effectually prevents the admission of the cold atmospheric air from the chimney, which, on the old plans of construction, is found by experience to rob the furnace and vessel of more than half the supply of heat which any given quantity of fuel is capable of yielding. The valves, sliders, and dampers, are not essential parts of the invention, but merely as regulators, which, in many cases, may be altogether omitted, without detriment to the operation of the fire.

Although Count RUMFORD has successfully extended his researches to discover the most economical plan in the management of fire, and the generation of heat for culinary and other purposes, it does not appear from his writings, that he had a distinct conception of the new method suggested by Mr. Rowntree, till after the enrolment of his specification in May 1793. Nay, says Mr. Hindmarsh, the Count evidently takes it for granted (see vol. II. p. 73, of his Essays), and even reasons on the fact, which he there supposes to be unavoidable, and beyond remedy, that the fire cannot be made to impinge against the sides of a vessel with the same force and effect as against the bottom: which is a plain proof, that at the time of writing that essay, he was totally unacquainted with Mr. Rowntree's method of applying and managing the fire; in which the very effect which the Count considers as a *desideratum* in science, and which appears to have been one grand object of his philosophical pursuits, is now in a great measure completed.

BOILING, in the culinary art, is a method of dressing animal food, vegetables, &c. by coction in hot water, for the purpose of removing their natural crudities, and rendering them more easy of digestion. By too much boiling, however, flesh is deprived of a considerable part of its nourishing juice, as the gelatinous substance of the meat is extracted, and incorporated with the water, while the spirituous and balsamic particles are dissipated by evaporation. The culinary process of *stewing* is more profitable, especially if conducted in close vessels, as it is better calculated to preserve and concentrate the most substantial and nutritious parts of animal food.

BOLES, are viscid earths more friable than clay: they are soft and unctuous, and gradually melt in the mouth, communicating a slight sensation of astringency. There is a great variety of these earths, which have been recommended as astringent, sudorific, and alexipharmic, but without sufficient grounds. They are still prescribed in fluxes, and complaints of the first passages.

BOMBAST, in composition, is an endeavour, by strained and turgid description, to give a low or familiar subject that importance of which it is not susceptible; instead, therefore, of being sublime, it always proves ridiculous. The style of a writer, who has no real genius or talent for description, is extremely prone to deviate into bombast, and vitiate the taste of others. Hence, books written in a redundant or affected style, ought never to be intrusted to the hands of youth, who are more apt to listen to, and imitate the language which is addressed to the imagination and the senses, than the serious and dignified admonitions which are supported by reason and experience.

BONES, are solid substances composed of animal earth and gluten. They support and form the stature of the body, defend its viscera, and give adhesion to the muscles. Their number in the human frame is generally 240; but in some individuals, who have two additional bones in each thumb and great toe, they amount to 248. The regular division of them is as follows: 63 bones of the head, including the 32 teeth; 53 of the trunk; 64 of the upper, and 60 of the lower extremities.

One of the most remarkable diseases of animal bones, is their occasional softness and reduction in the living body; of which there are several well-authenticated instances,

stances. The late Mr. Gooch, a respectable surgeon of London, relates the case of a woman naturally five feet six inches high, who was gradually reduced to three feet four inches. In rickety children, the bones are obviously softer than they ought to be in a sound state, owing, perhaps, to their erosion, occasioned by the discharge of an acrimonious humour. In a similar manner, the scurvy has often been remarked to affect these solid parts of the human frame. Hence, in the former instances, attention to a proper diet, gentle friction with coarse cloths, exercise, fresh air, and cold bathing, will frequently change the constitution of such children, insomuch, that at the age of twenty there will not remain the least symptom of their former debility.

It is generally believed, that the bones, in a healthy state, are insensible to pain, because the larger ones are unconnected with any nerve: hence the operation of the trepan has been performed upon sound persons, who were not under the influence of opium, without giving them any additional pain during the perforation of the skull. —See Fractures and Teeth.

Decomposition of Bones. After being separated from the animal, they may be hardened and softened, both by acids and alkalies, according to the quantity of saline matter employed, and the manner in which it is applied. Although Boerhaave asserts, that alkaline salts render them harder and firmer, and that acids make them softer and more flexible, yet these effects take place only in certain circumstances. Thus Newman found, that bones became harder and more compact by steeping them in oil of vitriol; but when this acid was in sufficient proportion, it destroyed their cohesion, and dissolved them. Dr. Lewis, on the other hand, observed, that diluted vitriolic acid, though it rendered them remarkably soft, made them at the same time brittle; but that either in aqua fortis, or spirit of salt diluted, as well as in the acetous acid, they became flexible and soft like leather. The most effectual and cheapest method of reducing the hardest bones to a soft pap or jelly, is that effected by the action of simple water, heated in what is called *Papin's Digester*; a machine consisting of a strong and close iron vessel, in which the steam of boiling liquors is confined, and thus a more intense degree of heat is produced than any fluid could otherwise acquire. This effect, however, may be accomplished in a much shorter time, when, instead of pure water, alkaline solutions are employed; yet the latter could not properly be used in any culinary process.

If bones be exposed to a moderate fire, either in open vessels, or in contact with the burning fuel, they become opaque, white, and friable: by increasing the fire, they are still more reduced, and easily crumble into a powder. But, if they be at first submitted to an intense heat, such as is required to melt copper or iron, they become firm, semi-transparent, and sonorous, not unlike hard mineral stones. This curious experiment deserves the farther researches of the chemist.

A method of producing phosphorus in large quantities from bones, has been invented by M. Scheele, who employed for this purpose the vitriolic acid: it has, therefore, been doubted, whether the phosphoric acid is naturally contained in the bones, and united with calcareous earth, or whether it is generated by a combination of the vitriolic acid with a certain quantity of lime. As, however, the phosphoric acid has likewise, though in a smaller quantity, been discovered in the gastric juice of animals, there is reason to conclude that it forms one of the elementary constituents of bones.—See BENZOINE.

Colouring of Bones.—This process may be performed either by immersing bones in the common dyeing liquors made of animal and vegetable substances, or staining them without heat, by different metallic solutions. To succeed in the former method, the bones should previously be boiled in a solution of alum, and afterwards steeped in a decoction made of any colouring substance. Thus, for instance, to stain them of a red colour, half a pound of Brazil-wood may be boiled for an hour in a gallon of strong lime-water, in which the bones are suffered to lie till they acquire a proper colour: if they assume too deep a hue of purple, it will be necessary to plunge them again into a solution of alum, which has the effect of bringing them to a crimson or scarlet shade.

By metallic solutions, bones may be easily spotted or variegated.—Thus a solution of silver in *aqua-fortis*, imparts, according to its strength, a brown or black colour; a solution of gold in *aqua-regia*, or in spirit of salt, a fine purple; a solution of copper in the acetous acid, a pleasant green; and solutions of the same metal in the volatile spirit of ammonia, at first a deep and beautiful blue; but which, on exposing it to the air, changes into a green, or blueish green. On touching the bone with the two solutions first mentioned, it acquires the desired tint in a few hours, when placed in the open air; but in those liquors made with copper, it should be steeped for at least twenty-four hours, sufficiently to imbibe the colour. In such cases as require immersion for some time, the bone may be variegated, by covering those parts which are intended to remain white, with wax, or other matter not soluble in the staining liquor.

Economical uses of Bones.—Beside the various toys, and other articles of domestic economy, made of bones, they are extensively useful in many of the chemical arts; for instance, to absorb the sulphur of ferruginous ores for rendering cast-iron malleable; to form tests and cupels, or vessels for refining gold and silver with lead; to make glasses and porcelain of a milky colour; to rectify volatile salts, and empyreumatic oils; to produce glue, &c. But the most important and beneficial uses, to which bones may be rendered subservient, are those in *rural economy*.

In EVELYN's *Philosophical Discourse of the Earth*, we meet with a note by Dr. A. HUNTER, the editor of a new edition of this treatise, published in 1778, from which we shall extract the following account: Bones are an excellent manure, though not generally known; they should, however, not be calcined, as their virtue will be dissipated by the fire. A. ST. LEGER, Esq. had once laid down to grass a large piece of very indifferent lime-stone land, with a crop of corn; and from this uniformly well-dressed piece he selected three rods of equal quality with the rest, and manured them with bones broken very small, at the rate of sixty bushels per acre. Upon the land thus managed, the crop was infinitely superior to the rest. The next year's grass was also more luxuriant, and has continued to preserve the same superiority for at least eight years, insomuch that in spring it is green three weeks before the rest of the field. He also dressed two acres with bones, in two different fields prepared for turnips, at sixty bushels to the acre, and found the crops incomparably more productive than the others managed in the common way. Upon grass-lands, he observed, that this kind of manure exerts its influence more powerfully in the second year than in the first. For whatever soil it be intended, the bones should be well broken, before they can be equally spread upon the land. No pieces should exceed the size of small marbles. To perform this necessary operation, he recommends the bones to be sufficiently bruised, by putting them under a circular stone which, being moved round upon its edge, by means of a horse, in the manner tanners grind their bark, will very expeditiously effect the purpose. Some people break them with small hammers upon a piece of iron, but that method is inferior to grinding. Although bones of all kinds may be used with advantage, yet those of fat cattle are doubtless the best; but unground bones should never be employed, as they are of little or no service to the soil. A. St. Leger has also found it very beneficial to mix ashes with the bones: a cart-load of the former being put to thirty or forty bushels of the latter, and heated for twenty-four hours (which may be known by the smoking of the heap), the whole should be turned. After lying ten days longer, this excellent manure will be fit for use. Lastly, Dr. Hunter remarks, that the best method of grinding bones, is that between two cast metal cylinders. And as mills are very rarely erected purposely for this operation, the apparatus may be added to any common water-mill, at a very trifling expence.

BONE-SPAVIN, is a bony excrescence, or hard swelling, on the inside of a horse's leg. A spavin, which begins on the lower part of the hock, is not so dangerous as that which grows higher, between the two round processes of the leg-bone; and that which appears near the edge, is less injurious than if it were situated more towards the middle and inwards, where it would, in a greater degree, impede the bending of the knee.

A swelling occasioned by a kick or blow, is not at first the true spavin, nor so dangerous as when it proceeds from a natural cause; and that which grows on the leg of a colt, is not so inveterate as that of a horse come to maturity. In old horses, the spavin generally is incurable.

The usual method of treating this disease is, by blisters, and the actual cautery. When a fullness on the fore part of the hock is occasioned by hard riding, or any other violence, cooling and repelling applications are proper, as in the case of bruises or strains.

Among the various prescriptions for the blistering ointment, the following, by Mr. Gibson, is preferable;

able: Nerve and marsh-mallow ointment, of each two ounces; quicksilver, one ounce, thoroughly mingled with one ounce of Venice turpentine; Spanish flies, powdered, a dram and a half; sublimate, one dram; oil of origanum, two drams.

When the hair is cut as close as possible, the ointment is to be applied pretty thick to the injured part, in the morning, and the horse should be kept tied up without any litter till night. He should then be untied, that he may lie down, and a pitch plaster fastened to the part, with a proper bandage.

After the blister has done running, and the scabs begin to peel off, another may be applied, which will have a still better effect; and in young horses, will generally complete the cure. But if the spavin has been of long standing, a repetition of the blister five or six times, will perhaps be requisite. Each application must be made at intervals of a fortnight or three weeks, lest the blemish of a scar, or baldness, remain on the part.

Spavins on old or full-aged horses, as they grow more inward, and run among the sinuosities of the joint, are, for the most part, incurable.

In such cases, the strongest caustic blisters must be applied, or the part immediately fired; but the best and safest way to preserve the use of the limb is, by long-repeated applications of the above-mentioned blistering ointment, for some months, if necessary. The horse, in the intervals, should be exercised moderately; and by degrees the hardness will be dissolved, and disappear.

If the spavin is deep, and runs so far into the joint that no application can reach it, all medicines will be unavailing. When the disease does not penetrate the joint, and the blistering method is found ineffectual, the swelling may be safely cauterized with a thin iron, forced pretty deeply into the substance; and it should afterwards be dressed according to the foregoing directions.

BOOK, a general name for most literary compositions; but should, with propriety, be applied to such productions only as extend to the size of a volume.

The writings of MOSES are allowed to be the most ancient of any extant; but as several are cited by this author, some must undoubtedly have been written previous to his time. The oldest books of a profane nature, with which we are acquainted, are HOMER's Poems; though the Greek authors mention no less than seventy other writers prior to HOMER.

The materials used by the ancients instead of paper, were of various kinds; as plates of lead and copper, the bark of trees, bricks, stone, wood, &c. Instead of wooden tablets, the leaves of the palm-tree were afterwards used, and the inner part of the bark of the lime, the ash, the maple, and the elm: as these could be rolled up, they received the name of *volumen*, or a volume, which appellation was afterwards transferred to similar rolls of paper, or parchment.

The material next introduced for the purpose of transmitting the records of the learned to posterity, was wax; and afterwards leather, or the skins of goats and sheep, which at length were manufactured into parchment: these were succeeded by lead, linen, silk, horn, and, lastly, paper. Books were first made square, in the form of blocks and tables; but that of rolls was afterwards found most convenient: they were composed of several sheets fastened together, and rolled upon a stick; the whole making a kind of column, which was managed by the stick as a handle, it being considered a crime to lay hold of the roll itself. The volume, when extended, was commonly fifty yards in length, and a yard and a half wide. The present form of books, consisting of separate leaves, was not unknown to the ancients, though little used by them.

With the form of books is also connected their internal economy, as the order and arrangement of lines and pages, margins, &c.: these have undergone many variations. At first, the letters were only divided into lines; afterwards into separate words, which by degrees were distinguished by accents, and distributed by points and stops into periods, paragraphs, chapters, and other divisions. The Orientals began their lines from the right, and carried them to the left; while the Greeks wrote in both directions, alternately beginning in the one, and returning in the other. The method of writing practised by the Chinese is still more curious, as they extend their lines from the top to the bottom of the page.

Complaints were made as early as the time of SOLOMON, respecting the *multiplicity* of books; and they are now too numerous, not only to be procured and read, but even to be known by their names or titles. The editors of the *Encyclopædia Britannica* remark, that "England has more to fear on this score than other countries, since, besides our own produce, we have for some years past drained our neighbours." It is but justice to observe, however, that this idea is unfounded, as it is a well known fact, that the number of volumes annually published on the Continent, and particularly in Germany, is more than four times the amount of those issued from the British press in the three united kingdoms: besides which, many hundred volumes are annually exported, thus rendering the number in the country nearly what it would be without the importation of foreign books. This truth will be evident to those who reflect on the relative difference between the price and quality of the paper employed on the Continent, and that used in this country, not to mention the extremely high price of labour, and many other circumstances, which, we apprehend, will ultimately tend to impede the progress of British Literature. But with respect to a superfluity of books, they are doubtless of use; for knowledge is ever advantageous, and cannot be too widely diffused.

We shall conclude this article, by stating a method of preserving books from the depredations of worms and insects. There is a very small insect that deposits its eggs in books during the month of August, especially on those leaves nearest the cover. These gradually produce a sort of mites, similar to what are generated in cheese, and which afterwards change their state, and become beetles: and when the time of their transformation approaches, they eat their way through, till they gain the extremity of the book. The best preventive against their attacks is mineral salts, to which all insects have an aversion. The salt called in the old system of chemistry, *arcanum duplicatum*, alum and vitriol, are proper for this purpose; a small quantity of which should be mixed with the paste used by book-binders. To prevent the depredations of the book-worm, M. PREDIGER advises book-binders to make their paste of starch instead of flour. He likewise directs a little pulverized alum to be strewed between the book and its cover, and also upon the shelves of the library.

BOOK-KEEPING, is the art of recording mercantile transactions in a systematic manner.

A merchant's books should contain every particular which relates to his affairs; and exhibit the state of his business, the connection of the different parts, with the amount and success of the whole. Accordingly, they should be so full and regular, as to afford information in every point for which they may be consulted.

Book-keeping comprehends the following heads: the debts owing to a merchant, and those due by him to others; the goods which belonged to him, with the quantity and value sold, and those which remain in his possession; also the amount of his stock when the books were opened, together with his profits and losses, and the extent of his property at present.

The Italian method of book-keeping by *double-entry*, is founded on the most universal principles, and is therefore the best in extensive and complicated mercantile transactions. Indeed the accountant who thoroughly understands it, can with facility either adopt or invent any other form better suited to any particular business.

According to the Italian method, three principal books, namely, the waste-book, journal, and ledger, are used. The waste-book, or day-book, begins with an inventory of the owner's goods, a list of debts due to him, and of the debts he owes to others; and it is continued with a clear statement of the money received or paid, and the goods bought or sold by him, &c. The accountant's first care should be, to have nothing defective; and his second, to insert nothing superfluous in the waste-book.

The journal is a concise record of transactions compiled from the waste-book, in the same order as they stand there, but expressed in a technical style. The whole art of writing the journal depends upon the proper choice of the D^{rs}. and C^{rs}. Every thing received, or person accountable to us, is D^{r}.; and every thing delivered, or person to whom we are accountable, is C^{r}. On these two comprehensive rules, and their various modifications, depends the regularity of accounts. As for the more particular rules, they will readily be suggested by the judgment of the accountant.

From the journal, the different transactions are posted in the ledger. Each account is distinguished by a proper title, and articles of the same kind received and delivered, are entered on opposite sides of the same folio. For instance, money received is entered on the one side, and money paid on the other; or goods bought on the one side, and goods sold on the other. The left hand page is called the D^r. side; the right hand page the C^r. side of the account; and the difference between the sums of the D^r. and C^r. sides is denominated the balance.

Accounts, in the ledger, are of three kinds, *personal, real,* and *fictitious*. Personal accounts are those opened for every person or company with whom the merchant has any dealings or credit; real accounts are those of property, such as ready money, goods, ships, houses, &c.; and fictitious accounts are stock, together with profit and loss, and its subsidiary accounts.

The stock account contains, on the D^r. side, the amounts of the debts due by the merchant when the books were opened; and on the C^r. the amount of money, goods, &c. belonging to him; consequently the balance shews the amount of his nett stock. Profit and loss account contains every article of gain on the C^r. and of loss on the D^r. side; therefore the balance is the nett gain or loss, which is posted on the proper side of the stock account above-mentioned.

Several subsidiary accounts are opened, to shorten and methodize that of profit and loss, such as *interest account*, proper expences, &c. These are used, or others invented, according to the nature and purposes of the business.

Accounts may be opened in the ledger, in the same order as they occur in the journal; or those of a similar kind may be placed together; the personal accounts in one part of the book, and the real accounts in another.

Besides the three principal, there are subsidiary books used by merchants of extensive connections and business. These are, the cash-book, book of charges of merchandize, book of house-expences, invoice-book, sales-book, bill-book, receipt-book, letter-book, and pocket-book. Some merchants also keep a memorandum-book; but the man of business cannot be restricted to these, as he will either use them, or invent others more conformable to the nature of his business.

In the year 1796, a patent was granted to Mr. EDWARD THOMAS JONES, of Bristol, for his method or plan of detecting errors in accounts of all kinds, by which they may be adjusted in a regular and concise manner. This work is entitled, *The English System of Book-keeping*, which requires a day-book, or journal, an alphabet, and a ledger, ruled in the following manner: namely, the day-book has three columns on each page, for receiving the amount of the transactions; one column of which to receive the amount of the debits and credits, one column to receive the debits only, and another to receive the credits only; or it may be ruled with only two columns on each page, one to receive the amount of the debits, and the other the amount of the credits. There must also be on each page of the day-book, four other columns ruled, two on the left side, next the amount of the debits, and two on the right side next the amount of the credits, for receiving the letter or mark of posting, and the page of the ledger to which each amount is to be posted. The alphabet need not be ruled at all, but must contain the name of every account in the ledger, the letter that is annexed to it as a mark of posting, and the page of the ledger. The ledger must be ruled with three, four, five, or seven columns on each page, as may be most agreeable, for receiving the amounts of the different transactions entered in the day-book.

But in order to prevent any mistakes that may happen from the hurry of business in a counting-house, Mr. Jones has given only *one* column for receiving the amount of every transaction, whether debits or credits, at the instant of making the entry: and, for the convenience of separating the debits from the credits, previous to posting, which is necessary to prevent confusion and perplexity, he has two other columns on the same page; that on the left side, into which the amount of every debit must be carefully entered, and that on the right for the amount of the credits; which columns must be cast up once a month. The column of debits and credits of itself forms one amount; the column for the debits produces a second amount; and the column of credits a third amount; which second and third amounts, added together, must exactly agree with the first amount, or the work is not done right. By this means, the man of business may obtain monthly such a statement of his affairs, as will shew how much he owes for that month, and how much is owing to him; and the debits being added together for any given time, with the value of the stock of goods on hand, will, when the amount of the credits is subtracted therefrom, shew the profits of the trade.

The patentee's manner of examining the books kept by this method, also professedly differs from that hitherto practised, as well in expedition as in the certain accuracy which attends the process; it being only necessary to cast up the columns through the ledger debits and credits, according to the examples given, and the amount of those columns, if right, must agree with the columns in the day-book for the same corresponding space of time. These castings should take place once a month, and if the amounts do not agree, the posting must then, but not else, be called over; and when the time, whether it be one, two, three, or four months, that is allotted to each column of the ledger, is expired, the amount of each column should be put at the bottom of the first page, and carried forward to the bottom of the next, and so on to the end of the accounts; taking care that the amount in the day-book, of each month's transactions, be brought into one gross amount for the same time.

Having already enlarged upon this subject, we shall only observe, that this new system of book-keeping, however ingeniously contrived, has not met with that general approbation to which it is apparently entitled. To enforce his claim to public patronage, Mr. Jones concludes the specification of his patent by asserting, that upon his plan every page will be proved in the progress of calculation, and "the balances of ten thousand ledgers could not unobservedly be taken off wrong."—We give him full credit for this assertion; though it has, perhaps by invidious rivals, been objected that his method is more complicated than the old Italian system of book-keeping; which has, by experience, been found fully adequate to the purpose of mercantile accuracy.

BOORCOLE, is a species of the *Brassica*, L. and generally cultivated in the open fields like turnips, cabbages, or the turnip-rooted cabbage.

It is one of those hardy plants, the leaves of which may be cut without detriment to its growth, and will produce a new crop in the course of a month or six weeks.

According to an experiment made by Mr. BAKER in the year 1763, an Irish acre of fallow ground, which was planted with boorcole, at the distance of two feet, and hoed in the Tullian method, produced plants which weighed about five pounds ten ounces each on an average, and the whole produce of an Irish acre was 40,096 pounds.

It should be observed, that the land must be well manured, and in a high state of tillage, for the cultivation of this plant, which, if kept constantly hoed, will grow very luxuriantly, and, in the hottest weather, be infinitely more brittle in the leaves than any other cultivated in gardens; which is a certain indication of its being a healthy plant. It is worthy of the attention of the farmer or grazier, on account of the rapidity of its growth, and the property of withstanding the effect of severe frosts, while it affords an excellent vegetable for the table, and may be used with advantage for feeding sheep.

Mr. BAKER farther observes, that sheep should not be suffered to depasture so long upon a crop of boorcole, as to injure the stalks; because its future growth will be checked by depriving it of the sprouting leaves.

BOOT, a cover or defence for the leg and foot, made of leather, and generally worn by horsemen. The boot is by no means a modern invention, as it was worn in the Roman army by the infantry as well as the cavalry. It was originally made of leather, but afterwards of brass or iron, that it might be proof against the sword.

There are various kinds of boots, as hunting-boots, fishing-boots, jack-boots, &c. The fishermen of New England preserve their boots water proof by the following composition: One pint of boiled lintseed oil, half a pound of mutton suet, six ounces of pure bees-wax, and four ounces of rosin. These ingredients are melted together over a slow fire, and the boots or shoes, when new and quite clean, are warmed, and rubbed with the composition till the leather is completely saturated.

There is an improved composition for preserving leather, the good effects of which are sufficiently ascertained. One pint of drying oil, two ounces of yellow wax, two ounces of spirit of turpentine, and half an ounce of Burgundy pitch, should be carefully melted together over a slow fire. With this mixture new shoes and boots are rubbed either in the sun, or at some distance from a fire, with a sponge or brush: the operation is to be repeated as often as they become dry, until they be fully saturated. In this manner, the leather becomes impervious to wet; the shoes or boots made of it last much longer than those made of common leather; acquire such softness and pliability that they never shrivel nor grow hard or inflexible; and, in that state, are the most effectual preservatives against cold and chilblains. It is, however, necessary to remark, that shoes or boots, thus prepared, ought not to be worn till they have become perfectly dry and elastic; as, in the contrary case, the leather will be too soft, and wear out much sooner than even the common kind.

BORAGE, the Common, or *Borago officinalis*, L. a native plant, frequently found growing in waste lands, and upon old walls; it is rough, and clothed with small prickly hairs; has alternate leaves, and bears blue spreading flowers in June and July. See WITH. 230, and *Engl. Bot.* 36.

The flowers of the borage are much frequented by bees, and the plant itself may be used as a culinary vegetable, or as an ingredient in lettuce-salad, to which it imparts an agreeable flavour. The whole of this plant abounds with nitrous particles, which may be easily obtained by elixation; for after evaporating the lixivium to a proper consistence, and allowing it to stand in a cool place, crystals will be formed, which deflagrate upon the fire, and possess all the properties of salt-petre.

BORAX, in chemistry, a salt produced in the mountains of Thibet, in Asia, both naturally and artificially by evaporation.

The borax imported from China is purer than that of Thibet, and is found in a natural state in small masses of irregular crystals, of a faint white colour. Beside the vitrescible earth, which is an essential principle of borax, it contains copper and the marine acid, but no traces of the vitriolic. It has also been clearly proved by experiments, that borax consists of fossil alkali, in some degree neutralized by a peculiar salt. When dissolved and crystalized, it forms small transparent masses; and the refiners have a method of shooting it into large crystals, which, however, in many respects differ from, and are inferior to, the genuine salt.

Borax is useful in metallurgy, for soldering; in the fusion of vitrifiable earths, with which it forms glass; as well as in several other chemical processes; and dyers frequently employ it for giving a gloss to silks.

Its medical properties have not been sufficiently investigated. Mr. BISSET recommends a weak solution of this salt in water, for healing aphthous crusts, or the thrush in the mouth and fauces of children. A small quantity of it, powdered and mixed with sugar, is often applied for the same purpose. We are not acquainted with a more balsamic application to sore nipples, or chapped lips and hands in frosty weather, than a few grains of borax dissolved in warm water, with the addition of a little pure honey.

BOTANY, that part of natural history which relates to plants or vegetables.

This pleasing science had the misfortune of being, from its infancy, considered merely as a branch of medicine; and while the naturalist was employed in discovering the virtues of plants, the knowledge of their organization was in a great measure neglected.

In consequence of this erroneous idea of botany, the study of it was for a long time confined to medicinal plants; which were searched for with a view to discover remedies.

On the revival of letters, instead of investigating plants in the garden of Nature, they were studied only in the writings of PLINY and

Dioscorides: thus translators, commentators, and practitioners, seldom agreeing, a variety of names was given to the same plant, and the same name to several plants. At length, more careful researches and many excellent observations were made; but the latter being enveloped in a chaos of nomenclature, physicians and herbalists no longer understood each other.

Botanists of real genius indeed occasionally published instructive books, among which the principal are the writings of Cordus, Gesner, Clusius, and Cœsalpinus; but each of these authors regulating his nomenclature by his own method, created new genera, or divided the old ones, according to his own fancy. Hence the genera and species were so intermingled and confounded, that almost every plant received as many names as there were authors employed in its description.

The advancement of the study of botany was, however, greatly promoted by the writings of the indefatigable Bauhins, two brothers, each of whom undertook an universal history of plants, including a synonymy, or exact list of the names of each plant in the works of all the writers that preceded them.

Meanwhile, voyages of discovery enriched botany with new treasures, and while the old names over-loaded the memory, new ones were invented for the newly discovered plants. In order to extricate themselves from this immense labyrinth, botanists were obliged to adopt some methodical arrangement. Ray, Herman, Rivinius, proposed their respective plans; but Tournefort, who published his system in 1697, surpassed them all. To him we are indebted for the first complete regular arrangement of the vegetable kingdom; his plates of generic characters are excellent, but his work is deficient, as it contains no characters or descriptions of the different species.

At length, Linnæus formed the vast project of new moulding the whole science of botany. Having prepared the rules by which it ought to be conducted, he determined the genera of plants, and afterwards the species; and by keeping all the old names that agreed with these new rules, and new modelling all the rest, he established a clear nomenclature, formed upon principles more consonant with Nature. He also invented specific names, which he joined to the generical ones, in order to distinguish the species.

The whole Linnæan system is founded on the idea, that there is in vegetables as well as in animals, a real distinction of the sexes; that each plant may be analysed by its several organs of fructification; and, consequently, that it is necessary to acquire an accurate knowledge of the *number*, *shape*, *situation*, and *proportion* of these parts. Hence, only the student will be enabled to understand the elements of the science. And as all vegetables are capable of producing blossoms and fruit, or seed, the following parts, which compose a flower, must be minutely examined in every plant, namely: 1. The *calyx*, or flower cup, or empalement; 2. The *corolla*, or blossom, or flower-leaf; 3. The *stamina*, or chives; 4. The *pistillum*, or pointal; 5. The *pericarpium*, or seed-vessel; 6. The *semina*, or seeds. To these may be added the nectary, or honey-cup; and the receptacle, or base.

It required the resolution, knowledge and ingenuity of LINNÆUS, to effect this reform with success. His system at first met with resistance, and meets with it still from his rivals in fame; but on account of its practical utility it has been almost universally adopted throughout Europe.

To pursue the study of plants with advantage, that of the *nomenclature* must not be neglected. Names, it is true, are abitrary; but if the most engaging part of *Natural History* merits the attention of the curious, it will be necessary to begin with learning the language of the writers, in order to know with precision to what objects the names employed by them actually belong.

The vegetables on the face of the globe may be considered as analogous to its inhabitants; under which view of the subject *vegetables* may be said to resemble the *inhabitants* in general; *classes*, the *nations*; *orders*, the *tribes*; *genera*, the *families*; *species*, the *individuals*; and *varieties*, the same *individuals* in different circumstances.

Beside the satisfaction which the study of the works of Nature, and especially that of botany, affords to an inquisitive mind, it counteracts the passion for more frivolous amusements, and always presents objects worthy of contemplation. Hence the late Dr. WITHERING very justly remarks, that, independently of its immediate use, the study of botany is as healthful as it is innocent; that it beguiles the tediousness of the road; furnishes amusement at every footstep of the solitary walk; and, above all, that it leads to pleasing reflections on the bounty, the wisdom, and the power of the Great CREATOR!

Among the latest *elementary* works of this branch of science are the following: Dr. WITHERING'S "*Arrangement of British Plants*," in four volumes 8vo. (1l. 11s. 6d.)—Prof. MARTYN'S translation of ROUSSEAU'S "*Letters on the Elements of Botany, addressed to a Lady*;" (7s.)—PRISCILLA WAKEFIELD'S "*Introduction to Botany*;" (3s. 6d. with plain, and 7s. with coloured plates);—and, lastly, Dr. HULL'S "*Introduction to the Study of Botany*."

BOTTLE, a small vessel made of glass, leather, or stone. Glass-bottles are better for cyder than those of any other substance.

Dr. PERCIVAL censures the common practice of cleansing wine-bottles with shot; for if, through inattention, any of it should remain, when the bottles are again filled with wine, the metal will be dissolved, and the liquor impregnated with its deleterious qualities. For this reason, he recommends potash in preference to shot, as a few ounces of the former dissolved in water, will cleanse a great number of bottles: and where the impurities adhere to the sides, a few pieces of blotting paper put into the vessel, and shaken with the water, will remove them in an expeditious manner.

BOTTLING, the filling of bottles with liquor, and corking them in order to preserve it. Particular caution should be used in bottling cyder: the best way to secure the bottles from bursting, is to have the liquor thoroughly fine before it be bottled. If one bottle break, it will be necessary to give vent to the remainder, and cork them up again. Weak cyder is more apt to burst the bottles than that of a stronger quality: they should be placed so that the corks may be kept wet, and stowed in a cellar not exposed to the changes and influence of the air. For this purpose, the ground is preferable to a frame; and a layer of saw-dust or sand better than the bare soil: but the most proper situation is a stream of running water.

Bottled beer may be much improved by putting a small quantity of crystals of tartar, spirituous liquor, or sugar boiled with the essence of cloves, into each bottle.

In order to ripen bottled liquors, they are sometimes exposed to moderate warmth, or the rays of the sun, which, in a few days, will bring them to maturity

BOTTS, in zoology, a species of short worms produced and nourished in the intestines of a horse.

As the flies, from whose eggs the botts are produced, do not frequent the neighbourhood of large towns, horses are not liable to this disease, if they be kept in the stable during summer and autumn.

In summer the females of these flies enter the anus of the horse, where they deposit their eggs, which are soon hatched by the heat, and the worms penetrate into the intestines, sometimes as far as the stomach.

Botts are very large maggots, composed of circular rings with prickly feet, by which they adhere to the part where they breed, and derive their nourishment. When they reach the stomach, they fasten themselves in its muscular coat, and suck the blood like leeches, each worm ulcerating the part where it fixes, till it resembles a honey-comb. These worms are not unfrequently the cause of convulsions.

Botts that are generated in the stomach of the horse are extremely dangerous, and seldom discoverable till they have acquired some strength, when they throw him into great agonies.

The symptoms of the other kinds, which are more troublesome than dangerous, are the following: The horse becomes lean, and looks jaded; his hair stands out roughly; he often strikes his hind feet against his belly; he is sometimes griped, but generally lies down quietly on his belly for a short time, and then gets up and eats his food. But the surest sign is, when he voids the botts in his dung.

For the cure of botts in the stomach, calomel should first be given in large quantities, and repeated at intervals. Æthiops mineral may be given afterwards.

The botts, that many horses are troubled with in the beginning of summer, are always seen on the straight gut, and are often thrown out with the dung and a yellowish matter. They are not dangerous in that part, though they render the horse restless. The season when they affect the animal is commonly in the months of May and June, after which they are rarely seen, as they do not continue with the horse above a fortnight or three weeks. Botts in the straight gut may be cured by giving the horse a spoonful of savin, cut small, once or twice a day, in oats or bran moistened, to which may be added three or four cloves of garlic. The following aloetic purge should also be given at intervals: Fine soccotrine aloes, ten drams; fresh jalap, one dram; aristolochia, or birthwort and myrrh powdered, of each two drams; oil of savin and amber, of each one dram; syrup of buckthorn, enough to form the whole into a ball.

BOUNTY, in commerce, a premium paid by government to the exporters and importers of certain commodities, such as corn, sail-cloth, silk-stockings, fish, &c.

Bounties are sometimes given to support a new manufacture against one of a similar kind established by other nations. To promote the manufacture of sail-cloth in this country, was doubtless an object of the greatest national importance, on account of our vast consumption of that article.

The principal intention of bounties to exporters, is to enable the British trader to become beneficial to his country, by giving him a compensation for his ingenuity and industry. As bounties are usually granted only for a limited time, they can never be the cause of any material loss to a nation, though avaricious men are often stimulated by a desire of gain, to convert to their private advantage what was intended for the benefit of the community.

BOW, a weapon made of wood, horn, or some other elastic substance, and bent into a curve, in which position it is kept by a string fastened to each end. The elastic power thus acquired, is such, that after bending, and unbending, an arrow is impelled with great force.

The long-bow, so called by way of distinction from the cross-bow, is the most ancient of all weapons, and has very generally been used by remote and barbarous nations. The Laplanders, who support themselves principally by hunting, excel the most civilized nations in the construction of this instrument. Their bow is composed of two pieces of strong elastic wood, of an equal size, which are flat on each side, and glewed together. This instrument expels the arrow with much greater force than if it were formed of one piece of similar dimensions.

The Indians still make use of the bow; and the repository of the Royal Society contains a West-Indian bow two yards long.

In the year 1749 a bow and quiver containing twenty-four arrows, made of reed, pointed with steel, and bearded, were found in the New Forest, Hampshire, supposed to have lain there since the reign of WILLIAM RUFUS, who was shot there 649 years previous to their discovery: the reeds were not decayed, nor the steel points rusty.

The strength of a bow is calculated on the principle, that its spring or elastic power is proportionate to the extent of its curve. The use of the bow is termed archery, and those who practise it, are called bowmen, or archers.—See ARCHERY.

Cross-bow. This weapon consists of a steel bow set in a shaft of wood, with a string and trigger. It is bent by means of a piece of steel, and expels bullets, large arrows, darts, &c. with great velocity.

BOWELS, or intestines, are very important parts in the animal economy (see ABDOMEN); and are often subject to diseases which, if neglected, may be attended with dangerous consequences. Of this nature, in particular, are inflammations of the bowels, which manifest themselves by a continued acute pain, frequently accompanied with a sensation of burning.

The abdomen is pained on the slightest touch, and the body is generally costive. After taking any kind of nutriment, the patient is inclined to vomit; but the principal symptom, by which an inflammatory state of the intestines may be distinguished from a mere colic, is a peculiar fever, with a small, though hard pulse, while the heat in the extremities of the body continues almost the same as when in a state of health. The most frequent causes of this dangerous complaint are, acrid substances in the bowels; crude and hardened feces; confined ruptures; suppressed hemorrhages; violent diarrhœas and dysenteries; abortions, &c. At their commencement, inflammations are often confounded with other complaints; and sometimes they terminate in a fatal mortification, though more frequently in suppuration. The degree of danger may be ascertained by the increasing coldness of the extremities, and the more or less inveterate obstipations of the bowels. Hiccough, and vomiting of excrements, indicate the approach of dissolution.

If the inflammation be occasioned by a confined rupture, it sometimes may be reduced by fomentations with cold water and ice, or still more effectually by dropping and evaporating vitriolic æther on the protuberant part. Diluent and emollient liquids are of no service in this case, as they only contribute to distend the bowels; and where the external application of cold has no effect, the patient must, without delay, submit to an operation.

Suppressed hemorrhoids, and other natural fluxes, should be restored by applying leeches to the parts, and repeated warm fomentations. Diarrhœas and dysenteries ought to be treated according to their causes; and poison introduced into the stomach, should be remedied according to the rules given under the head of ANTIDOTES.

When there is reason to suspect an inflammation, venesection will be necessary; but the quantity of blood drawn must be regulated by the strength of the patient, and the nature of the fever. The bowels should be opened by emollient clysters; or, if these prove ineffectual, strong solutions of pot-ash, in vinegar, ought, without delay, to be injected, and the abdomen rubbed with balsamic and antispasmodic embrocations, such as the camphorated liniment, mixed with an equal quantity of honey; or, in cases of extremity, the latter, dissolved in a strong decoction made of sage-leaves and vinegar. If these remedies produce no relief, the smoke of tobacco may be introduced by the rectum, and blisters applied to the abdomen. But, during the obstipation, no medicines should be used *internally*; as stimulating the stomach and bowels cannot fail to increase the inflammation, and thus endanger the life of the patient.

Diseases of the Bowels in Horses. It is difficult to form a proper judgment respecting disorders of the stomach and bowels of these animals. If a healthy horse, on taking cold after hard riding, &c. should have a moderate purging, it ought not to be stopped, but rather encouraged with an opening diet and water gruel. But if it continues long, with gripings; if the horse loses his appetite and flesh, and voids the mucus of the bowels, or other slimy matter, the following drench should be given, and repeated every other day for three times. Lenetive electuary and cream of tartar, of each four ounces, yellow rosin, finely powdered, one ounce, and four ounces of sweet oil, mixed in a pint of water gruel.

If the distemper increases, and the horse's flanks and belly appear inflated, a clyster should be given, of chamomile flowers one handful, red-roses half a handful, pomegranate and balaustines, of each an ounce, boiled in two quarts of water to one; and strained with three ounces of diascordium, and one of mithridate, dissolved in it, to which may be added a pint of port wine. This mixture should be injected once a day, and an ounce of diascordium given in the animal's night-drink.

When the griping is very severe, in consequence of the mucus of the bowels being washed away, a clyster, composed of two quarts of tripe-broth, or thin starch, half a pint of the oil of olives, the yolk of six eggs, well broke, and two or three ounces of coarse sugar, should frequently be injected warm.

Horses that have weak stomachs, or bowels, void their aliment undigested; and they are generally lean. The following purge has been found an efficacious remedy. Socotrine aloes, six drams; rhubarb powdered, three drams; myrrh and saffron, each a dram; made into a ball with syrup of ginger. This purge should be given two or three times, and afterwards an infusion of zedoary, gentian, Winter's bark, and orange-peel, of each two ounces; pomegranate, bark and balaustines, each an ounce; chamomile flowers and centaury, each a handful; cinnamon and cloves, each an ounce; the whole steeped in a gallon of port, or strong beer, should be given to the quantity of a pint every morning. For the cure of the bloody-flux in horses, the following clyster is highly esteemed: oak-bark, four ounces; tormentil-root, two ounces; burnt hartshorn, three ounces; boiled in three quarts of forge-water to two, and strained with the addition of two ounces of diascordium, four ounces of starch, and half a dram of opium. Gum-arabic dissolved in hartshorn should be the horse's usual drink.

In costiveness, gentle purgatives, such as cream of tartar, Glauber's salts, and lenetive electuary, should be given. Four ounces of any two of these dissolved in warm ale, repeated every other morning in the course of one week, and assisted by an emollient clyster prepared with a handful of salt, will answer this purpose. Scalded bran, with an ounce of fenugreek and lintseed, occasionally given, will prevent costiveness. But where it is constitutional, and the horse continues in perfect health, no inconvenience will arise from it; nay, it is well known, that such horses are remarkably vigorous and hardy.

BOX, generally implies a small coffer, or chest, to contain articles of any kind.

The term is also employed to express an uncertain quantity or measure: a box of quicksilver, for instance, contains from one to two hundred weight; a box of prunella only fourteen pounds; and among ironmongers, a box of rings for keys, two gross, &c.

BOX-TREE, or *Buxus*, L. a genus of plants containing three species; namely, the *sempervirens*, or common box, with oval leaves; the *angustifolia*, or narrow-leaved box; and the *suffruticosa*, or Dutch box; the first of which only is indigenous. The two first-mentioned species, grow in great abundance upon Box-hill, near Dorking, in Surrey, where there were formerly large trees of this kind. Of the first species, there are two or three varieties, which are propagated in gardens; and this, as well as the second, may be either raised from seeds or cuttings; the latter should be planted or sown in autumn, on a shady border.

Box-trees may be transplanted at any time, except Midsummer, provided they be taken up with a good mass of earth, but the best time for their removal is October. The Dutch, or dwarf-box, is increased by parting the roots, or planting the slips: it should be intermixed with other evergreens.

The uses of the large kind of box are various: many articles of turnery, and musical instruments, are manufactured of its wood: which is of greater specific gravity than any other of European growth, as it will not float upon water. In Paris, combs are made of no other material than this wood; and the quantity imported annually from Spain into that city, is estimated at 10,000 livres. Box admits of a beautiful polish when made into articles of furniture, for which it is now much employed, as its bitter quality renders it secure from the attacks of worms.

It is asserted, that a decoction of box-wood rubbed on the head, will speedily restore the hair decayed in consequence of malignant fevers; but care should be taken in applying it, to prevent it from touching the skin of the face, which, in consequence of this embrocation, would likewise be covered with hair. A similar decoction has been recommended as a powerful sudorific, even preferable to Guaiacum; though, at present, neither the wood nor the leaves of the box-tree are used for medicinal purposes.

BOXING, the art of fighting with the fists, which, among the Romans, were either naked, or inclosed a stone or leaden ball. Hence this exercise is very ancient, having been in vogue in the heroic ages.

To the disgrace of this country, the art of boxing, about half a century since, formed a regular kind of amusement, was encouraged by the first nobility of the kingdom, and even tolerated by the magistrates. About the time above-mentioned, a booth was erected at Tottenham-court, to which the public paid for admission the same as at a regular theatre, and the profits were divided among the combatants; the victor receiving two-thirds, and the remainder devolving to the loser. In consequence of the inconveniencies sustained at TAYLOR's booth, by the patrons of this refined art, Mr. BROUGHTON, then the principal actor in these exhibitions, erected a more commodious amphitheatre near Oxford-street. This barbarous amusement was at length neglected; though within these few years it has again enaged a considerable degree of the public attention: a fatal issue, however, which took place at one of the combats, again brought the practice into disrepute. On this occasion, one of the combatants was killed on the spot; and His Royal Highness the PRINCE of WALES, who was present, declared, that on account of the dreadful example he had then witnessed, he would never again be present at, or patronize another exhibition of a similar kind.

Boxing also signifies the tapping of a tree, to make it yield its juice. This operation is performed on the maple, by making a hole in the side of the tree, about a foot from the ground, with an auger or chisel: from this juice or sap a good sugar may be extracted.

BRACES, a supplementary article of dress, now very generally adopted; which by rendering a tight cincture altogether unnecessary, cannot be too much recommended, both to men and women, for the sake of health as well as comfort. If they were used to keep up the stockings, instead of tight garters, it would be an improvement of much greater moment than many are inclined to imagine; for garters doubtless occasion great mischief, whether tied above or below the knee, in causing the part to which they are applied to acquire an unnatural hardness, in disposing the thighs and legs to dropsy, and inducing great fatigue in walking.

BRAIN, in anatomy, a great viscus in the cavity of the skull, of an oval figure, and larger in man, in proportion to his size, than in any other animal. The brain is uniformly considered as the grand *sensorium* of the body, or the organ of all the senses; and hence it is supposed, not without reason, to be the seat of the soul. The most important functions of an animal body are those of the brain. To afford a more distinct view of the subject, we shall mention a few experiments which have been made upon animals.

If the brain be irritated, dreadful convulsions take place all over the body. If any part of the brain be compressed, that part of the body which derives its nerves from the compressed part, is immediately deprived of motion and sensation. On compressing, tying, or dividing a nerve, the muscles to which the nerve proceeds, become paralytic. If the nerve thus compressed, tied, or divided, had before any particular sensation, it exists no longer; but, on removing the compression, or untying it, its peculiar sense returns.

From these phenomena, it is evident, that every sensation in an animal body is derived from the brain, or from the spinal marrow, which is a continuation of the brain; and that it is conveyed thence, through the medium of the nerves, to all parts of the sentient body. But, in what manner the various sensations are produced by the nerves, and how the *will* operates upon the contiguous and remote organs, so as to put them into instantaneous motion, are difficulties which have never been satisfactorily explained, and, in all probability, will always baffle the keenest investigation.

As the brain is the representative organ of the mind, its sound and perfect state is of the utmost importance in the exercise of the intellect. If, therefore, the brain of an individual, be preternaturally soft, or too firm and hard, or specifically too light, or proportionately too small; or if it be in any manner compressed or shaken by external violence; or if acrimonious humours should settle on it, in consequence of various diseases; or, lastly, if in plethoric habits too great a portion of blood should flow towards the head, and too much extend its vessels;—in all these cases, the representing faculty will more or less partake of the disorder.

order. Thus, the power of imagination, or fancy, is sometimes so much increased, that the patient is either in part, or entirely, deprived of the faculty of judgment. Such, for instance, is the case in delirious persons, who are then only called maniacs, when a total privation of their reasoning faculty is evident. In ideots, or stupid people, however, the mental disease arises chiefly from their incapacity of comprehending and properly arranging ideas.

The causes of these humiliating derangements of the human mind, though various, may be reduced to the following heads: namely, inordinate passions, especially those which are attended with a great dissipation of strength; debauchery of every kind; an irregular mode of life; excessive eating and drinking; intense, as well as long-continued application to study; and likewise, a sudden change of climate, air, and aliment.

It deserves to be pointed out as a vulgar error, that abscesses of the brain discharge themselves through the mouth and ears; and that snuff is liable to enter into the brain; neither of these is capable of passing through that bone, which has the form of a sieve; nor is any matter, or fluid, secreted in a common cold, evacuated by that canal, though discharged through the nostrils. The seat of this disease is, indeed, not in the brain, but in the cavities of the nose; and if imposthumes take place in the ear, they suppurate and empty themselves externally.

Inflammation of the Brain, is a disease more common in hot than in temperate climates: in the latter, however, it may also take place from external violence, or in consequence of severe falls, blows, and bruises upon the head; night-watching; hard-drinking; strong passions, especially those of grief, anger, and anxiety; exposure to the heat of the sun during sleep, with the head uncovered, &c. The principal symptoms of this dangerous malady are, pain of the head, redness of the eyes, want of sleep, and slight dropping of blood from the nose: these are attended with costiveness and a retention of urine. As the disease, when neglected, is often fatal in a few days, medical advice should be called in without delay. Meanwhile, the patient ought to be kept as quiet as possible, and free from the access of strong light; his body must be kept open by clysters; the legs bathed in warm water; the bleeding of the nose promoted by warm fomentations to the part; and the head, after being shaved, should be frequently rubbed with vinegar and water; or cloths dipped in the following solution may be applied, and repeated every hour, or half hour, with the best effect. Take two ounces of nitre, and one ounce of sal ammoniac, dissolve them in five pints of water and half a pint of strong vinegar. Of this mixture the patient may also drink a table spoonful every hour, or oftener.

BRAKE is a large and weighty harrow, used to reduce a stubborn soil. It consists of four square bulls, each side five inches thick, and six feet and a half in length. The teeth are seventeen inches long, and bend forward like a coulter; four of these are inserted in each bull, fixed above, with a screw nut, having twelve inches free below, with a heel close to the under part of the bull, to prevent its being pushed back by stones. This instrument requires four horses, or the same number of oxen, and may be applied with great advantage in fallowing strong clay that requires frequent ploughings, as a breaking between each ploughing will pulverize the soil. In the month of March or April, on ploughing strong ground for barley, a cross brakeing is preferable to a cross ploughing, and may be performed at half the expence.

A brake with a greater number of teeth than that above described, is not proper for ground that is rendered adhesive by the roots of plants, such as land newly broken up: on the contrary, a less number of teeth would not sufficiently break the clods.

BRAMBLE, the Common, or *Rubus fruticosus*, L. a species of the raspberry bush, which grows wild in hedges, and has three varieties, one of which bears white fruit.—See With. 469. There are several other species indigenous in England; as the *saxatilis*, or stone bramble, the *arcticus*, or dwarf crimson bramble, the *chamæmorus*, or mountain bramble, by some called cloud-berry, and the *corylifolius*, or hazel-leaved bramble.

The bad effects of the fruit of the bramble, when eaten too freely, have already been mentioned under the article Blackberry. In Provence, it is employed in the colouring of wine. The Russians mix the berries of the *saxatilis* with honey, which, when fermented, is a pleasant beverage. Wine and vinegar are also made from the fruit of the bramble; and a syrup and jelly prepared from it, are used as gentle astringents. The leaves afford several colours in dyeing.

As this plant is of quick growth, it may be advantageously employed for inclosures; because it defends the young quick-set hedge from sheep, and by intertwining itself with a dead hedge, preserves it from injury. The usual method of planting it, is in two rows upon the bank, the lower of bramble, and the upper of white-thorn.

BRAN, the husks of wheat, which when ground are separated from the flour by a sieve. It contains a portion of the farinaceous matter, less glutinous than flour, and slightly detergent and purgative. Infusions of bran are often applied externally, to cleanse the hands instead of soap; and it also removes scurf and dandriff.

Bran may, in times of scarcity, be advantageously employed in the making of common household bread; this is effected by previously boiling the bran in water, and then adding the whole decoction to the dough: thus the bran will be sufficiently softened, and divested of its dry husky quality; while the nutritive part, which is supposed to contain an essential oil, is duly prepared for food. It is asserted, that the increase in the quantity of bread, by the addition of 14lb. 14 oz. of bran to 56lb. of flour, is from 34lb. to 36lb. of bread, beyond what is produced by the common mode. In one instance, 56lb. of flour, with 14lb. 14 oz. of bran, produced, on being weighed the next day, when cold, 106lb. and a half of bread; which is above half as much more than what is commonly made, and about twice the quantity obtained from a bushel of wheat, when merely the fine flour is used.

BRANDY, is a spirituous and inflammable liquor, obtained by distillation from wine. French brandies are accounted the best in

Europe; and those of Bourdeaux, Rochelle, Cogniac, Charenton, &c. are held in the highest estimation. Good brandy is clear, not too hot, nor sharp, and of a pleasant vinous flavour. French brandy acquires by age a great degree of softness, and at the same time a yellowish brown colour, which our distillers have imitated in their artificial preparations. But this colour being found only in such brandies as have become mellow by long keeping, it follows that the ingredient, from which it is extracted, is the wood of the cask, and that the brandy in reality has received a tincture from the oak. The peculiar flavour which French brandies possess, is supposed to be derived from an essential oil of wine, mixed with the spirit; but, more probably, it originates from the very nature of the grape, or the wine-lees.

It deserves to be remarked, that our distillers frequently make use of the *spirit of nitrous æther*, commonly called, dulcified spirit of nitre; a very small proportion of which, added to pure whiskey, or a liquor obtained by the distillation of malt, imparts to it a flavour, not unlike that of French brandy.

A vinous spirit has been extracted from carrots by Mr. THOMAS HORNBY, of York, who, in 1788, communicated to Dr. HUNTER a particular account of the whole process. This may be viewed in the light of a national advantage, as it affords the means of supplying another material for the distiller, and of saving great quantities of barley and wheat. By Mr. HORNBY's experiment, it was found, that an acre of carrots (20 tons) produced 240 gallons of spirit, which is considerably more than what can be obtained from five quarters of barley, the average produce of an acre.

Brandy, even of the most genuine kind, is less wholesome than rum; but the counterfeit and adulterated sorts are exceedingly detrimental to those who are habitually addicted to the use of this pernicious liquor. It should, therefore, be drunk very moderately, rather from necessity than for gratification.—When the stomach is empty, weak, and lax, a moderate dram excites a pleasant warmth and gentle tension; it is said to promote digestion, by dissolving the viscid phlegm which loaded that organ, invigorating its fibres, and stimulating its coats to act with more vigour. Yet all these good effects will not counterbalance the mischiefs done by an indiscreet and immoderate use of this cordial. Melancholy tempers, as well as choleric and sanguine habits, cannot fail to be injured by ardent spirits; and, in short, a too free use of them, in any constitution, is of the most fatal consequence. Hence, SYDENHAM with great justice and propriety exclaims, "Would to God brandy were totally abstained from, or used only on occasions to support Nature, and not destroy it, unless it were thought proper to prohibit any internal use of it at all, and leave it entirely to surgeons for bathing ulcers and burns."—See also DISTILLING.

BRASS, in metallurgy, is a factitious metal, made of copper and zinc, or *lapis calaminaris*. The French call it *yellow copper*. The Scriptures inform us, that the first formation of brass was previous to the deluge; but the use of it was not, as is generally believed, and as the Arundelian marbles assert, prior to the knowledge of iron. In the earliest ages, whose manners have been delineated by history, we find the weapons of their warriors invariably framed of this factitious metal. Military nations were naturally studious of brightness in their arms: and the Ancient Britons, particularly, gloried in the neatness of theirs. Hence various nations continued to fabricate their arms of brass, even after the discovery of iron.

By long calcination alone, and without the mixture of any other substance with it, brass affords a beautiful green or blue colour for glass: but if it be calcined with powdered sulphur, it will give a red, yellow, or chalcedony colour, according to the quantity, and other variations in using it.

Brass-colour, is that prepared by colour-men and braziers to imitate brass; of which there are two sorts: namely, the red brass, or bronze, which is mixed with red-ochre, finely pulverized; and the yellow, or gilt brass, which is made of copper-filings only. Both sorts are used with varnish.

Corinthian brass, is a mixture of gold, silver, and copper; so called from the melting and running together of immense quantities of those metals, when the city of Corinth was sacked and burnt, 146 years before Christ.

Brassica. See Cabbage, Colewort, Rape, Rocket, and Turnip.

BRAWN, is the flesh of a boar, pickled or souced, which is always found to be better tasted, according to the greater age of the animal.—The most approved method of preparing it is as follows: After the boar is killed, take the flitches only, without the legs, and extract the bones from them; sprinkle the flesh with salt, and lay it in a tray till the blood is drained off; let it then be salted a little more, and rolled up as hard as possible. The collar of brawn should be made of the whole length of the flitch, so as to measure nine or ten inches in diameter. The flesh thus prepared is to be boiled in a large kettle or copper, till it becomes tender enough to be pierced with a straw: then set it by, till it is thoroughly cold, and immerse it into the following pickle: To every gallon of water, put near two handfuls of salt, and as much wheat-bran; boil them well together; then drain the liquor from the bran as clear as possible; and when the liquor is quite cold, put the bran into it.

BREAD, an important article of food, prepared of flour kneaded with a mixture of yeast, water, and salt, and afterwards baked in an oven.

Mankind seem to have an universal appetite for bread, which may be accounted for on the simple principle, that the preparation of our food depends on the mixture of the animal fluids in every stage. As, among others, the saliva is necessary, it requires dry food as a stimulus to draw it forth; for which reason we use bread with meat, which otherwise would be too quickly swallowed. Bread serves as a medium to blend the oil and water of food in the stomach, which it stimulates; and it is peculiarly proper for that purpose, being bulky without too much solidity, and firm without difficulty of solution.

Before the invention of mills for grinding corn, bread was prepared by boiling the grain, and forming it into viscous cakes, not very agreeable to the palate, and difficult of digestion. In process of time, machines were constructed for grinding corn, as well as for separating the pure flour; and a method was discovered to raise the dough by fermentation. Dough may be fermented either by *leaven* or by *yeast*; but as the latter raises the kneaded mass more uniformly, and produces the sweetest and lightest bread, it is generally preferred. Bread well raised and baked is not only more agreeable to the taste than unfermented bread, but more readily mixes with water, without forming a viscous mass, or puff, and is at the same time more easily digested in the stomach.

Bread in this country is divided into three kinds, namely, white, wheaten, and household. Fine white bread is made only of flour; the wheaten contains a mixture of the finer part of the bran; and the household of the whole substance of the grain.

An act for regulating the assize of bread was passed in the year 1773; by which it was enacted, that all bread made of the flour of wheat, and which shall be the whole produce of the grain, the hull thereof only excepted, and which shall weigh three-fourth parts of the weight of the wheat, shall be allowed to be made, baked and sold, and shall be understood to be a standard wheaten bread; also, that every standard wheaten peck loaf shall always weigh 17 lb. 6 oz. avoirdupois; every half peck loaf 8 lb. 11 oz.; and every quartern loaf 4 lb. 5½ oz.; and be marked with the letters S. W.; and that every peck loaf, half peck loaf, and quartern loaf, shall always be sold, as to price, in proportion to each other respectively.

Although we have, in the article Baking, given general directions for successfully conducting this complicated process, yet we think it will be useful, in this place, to add, by way of supplement, a few particulars relative to this subject, and more especially applicable to domestic purposes. Mr. Dossie, who appears to have paid great attention to the art of baking, gives the following simple and much approved method of making good white bread: Take of fine flour, six pounds; of water, moderately warm, but not hot, two pints and a half; of liquid yeast, eight spoonfuls; and of salt, two ounces. Put about a pint of the warm water to the yeast, and mix them well, by beating them together with a whisk. Let the salt be put to the remaining part of the water, and stirred till completely dissolved. Then put both quantities of the fluid gradually to the flour, and knead the mass well till the whole is properly mixed. The dough thus made must stand four or five hours, that is, till the exact moment of its being fully risen, and before it is sensibly perceived to fall. It is then to be formed into loaves, and immediately placed in the oven. To bake it properly, is attended with some difficulty to those who are not skilled in the art. The first care is to see that the oven be sufficiently heated, yet not to such a degree as to burn the crust. If a green vegetable turns black when put in, the oven will scorch the bread; in which case it must stand open till the heat has somewhat abated. The next circumstance to be attended to is, that the mouth of the oven be well closed, till the bread has risen to its full height, which will not take place in less than two or three hours. After this, but not before, the oven may be opened for the purpose of viewing the bread, and seeing that it is baked without being either burnt or too crusty; for if the mouth of the oven be not kept closely stopped till the bread is fully risen, it will flatten and become heavy. When properly managed, the above-mentioned ingredients will have lost about one pound two ounces in weight, so that a well-baked loaf of this kind should amount to seven pounds twelve ounces.

Bread may be made *without yeast*, as is practised in Hungary, by the following process: Boil two good handfuls of hops in four quarts of water; pour the decoction upon as much wheat bran as the liquor will moisten. Then add four or five pounds of leaven; mix the whole together, till perfectly united. Put this mass into a warm place for twenty-four hours; then divide it into pieces about the size of a hen's egg; let these be dried in the air, but not in the sun, and they will keep good for six months. Or, make the above into six large loaves, take six good handfuls of dough, broken small, and dissolved in eight quarts of warm water, and poured through a sieve into one end of the bread-trough; then pour three quarts more of warm water through the sieve after it, and what remains in the sieve must be well expressed.

Like all other farinaceous substances, bread is very nourishing, on account of the copious mucilage it contains; but, if eaten too freely, it is productive of viscidity which obstructs the intestines, and lays the foundation of habitual costiveness. Leavened bread, or such as has acquired an acidulated taste by a slow fermentation of the dough, is cooling and antiseptic. By this process, all the viscous are combined with the drier parts of the flour, and the fixed air is expelled in baking. New baked bread contains a large proportion of indigestible paste, which may be rendered less unwholesome by allowing it to dry for two or three days, or by toasting it. This mode ought to be adopted, both on account of health and economy, especially in times of scarcity. Stale bread, in every respect, deserves the preference to that which is newly baked; and persons troubled with flatulency, cramp of the stomach, or indigestion, should abstain from new bread, and particularly from hot rolls.

Various substances have been used for bread, instead of wheat. In the years 1629 and 1630, when there was a dearth in this country, bread was made in London of turnips, on the recommendation of Dr. Beale. In 1693 also, when corn was very dear, a great quantity of turnip-bread was made in several parts of the kingdom, but particularly in Essex, by a receipt registered in the Philosophical Transactions. The process is, to put the turnips into a kettle over a slow fire, till they become soft; they are then taken out, squeezed, and drained as dry as possible, and afterwards mashed and mixed with an equal weight of flour, and kneaded with yeast, salt, and a little warm water.

The following is another method of making bread of turnips, which deserves to be recommended for its cheapness: Wash clean, pare, and afterwards boil a number of turnips, till they become soft enough to mash; press the greatest part of the water out of them, then mix them with an equal weight of wheat-meal, make the dough in the usual manner with yeast, &c.; it will rise well in the trough, and, after being well kneaded, may be formed into loaves and put into the oven. Bread prepared in this manner has a peculiar sweetish taste, which is by no means disagreeable; it is as light and white as the wheaten, and should be kept about twelve hours before it is cut, when the smell and taste of the turnip will scarcely be perceptible.

Potatoes have also been made into bread, by different processes. The simplest is to choose the large mealy sort, boil them as for eating, then peel and mash them very fine, without adding any water. Two parts of wheat flour are added to one of potatoes, and a little more yeast than usual. The whole mass is to be kneaded into dough, and allowed to stand a proper time to rise and ferment, before it is put into the oven. Bread thus prepared is good and wholesome; and if bakers were to make use of no worse ingredients than this nutritive root, they might be justified in times of scarcity, provided they sold it at a moderate price, and under proper limitations.

M. Parmentier found, from a variety of experiments, that good bread might be made of equal quantities of flour and potatoe meal. He also obtained well-fermented bread of a good colour and taste, from a mixture of raw potatoe-pulp and wheaten meal, with the addition of yeast and salt.

Dr. Darwin asserts, that if eight pounds of good raw potatoes be grated into cold water, and after stirring the mixture the starch be left to subside, and when collected, it be mixed with eight pounds of boiled potatoes, the mass will make as good bread as that from the best wheaten flour. He likewise observes, that hay, which has been kept in stacks, so as to undergo the saccharine process, may be so managed, by grinding and fermentation with yeast, like bread, as to serve in part for the sustenance of mankind in times of great scarcity. As an instance of the very nutritive quality of hay, it is mentioned, that a cow, after drinking a strong infusion of it, for some time, produced above double the usual quantity of milk. Hence, if bread cannot be made from ground hay, there is reason to believe, that a nutritive beverage may be prepared from it, either in its saccharine state, or by fermenting it into a kind of beer.

There are other vegetables, says Dr. Darwin, which would probably afford wholesome nutriment, either by boiling, or drying and grinding them, or by both these processes. Among these may be reckoned perhaps the tops and bark of gooseberry-trees, holly, gorse, and hawthorn. The inner bark of the elm may be converted into a kind of gruel, and the roots of fern, and probably those of many other plants, such as grass or clover, might yield nourishment either by boiling, baking and separating the fibres from the pulp, or by extracting the starch from those which possess an acrid mucilage, such as the white bryony.

The adulteration of flour and bread has often been the subject of animadversion. Mealmen and millers have been accused of adding chalk, lime, and whiting to the flour, and bakers of mixing alum with the dough. There is much reason to suspect, that these practices are but too prevalent.

It has been asserted, that the adulteration of bread is owing to the legal distinctions in the quality of it, and to our making colour the standard of goodness. Dr. DARWIN observes, that where much alum is mixed with bread, it may be easily distinguished by the eye: when two loaves so adulterated have stuck together in the oven, they break from each other with a much smoother surface, where they had adhered, than those loaves do which contain no alum.

An excellent method of making bread of rice is, by boiling three-fourths of wheaten flour and one-fourth of rice separately. The rice should be well boiled, the water squeezed out (which may be afterwards used as starch for linen, for there can be no better), and the mass should then be mixed with the flour. It is made in the same manner as common bread, and is very nutritive. One pound and a half of flour mixed with half a pound of rice, will produce a loaf weighing from three pounds to three pounds two ounces, which is greater than that obtained by baking bread of wheat flour only. Rice has also been tried in the same proportion with barley, and makes good bread for labouring people; but the gain in baking is by no means equal to that obtained by mixing it with wheat.—See RICE.

Another mode of preparing bread with all the bran, the result of which we have stated under the head of BRAN, is as follows: "Take seven pounds seven ounces of bran and pollard, and fourteen quarts of water, and boil the whole very gently over a slow fire. When the mixture begins to swell and thicken, let it be frequently stirred, to prevent its boiling over, or burning either at the bottom or sides of the vessel. After having boiled two hours, it will acquire the consistence of a thin pudding. Now put it into a clean cloth, and squeeze out the liquor: take a quart of this, mix it with three pints of yeast, and set the sponge for twenty-eight pounds of flour. The mass, bran, and pollard, even after the liquor has been separated, will be found to be above four times its original weight; it is then to be placed near the fire. In about two hours, the sponge will have sufficiently risen. The bran and pollard, then lukewarm, should be mixed with the flour; and, after adding half a pound of salt, the whole must be well kneaded, with one quart of the bran liquor. Thus prepared, the dough is formed into loaves, and baked for two hours and a quarter in a common oven. The bread, when cold, will weigh one half more than the same quantity of flour would, without the addition of the bran.

If the bran-water only is used, and the bran itself (which, by the boiling, increases considerably in weight) is not added to the dough, the increase of bread will still be considerable; but not more than one-third of the increase obtained, when all the bran is used.

The great advantage of eating pure and genuine bread must be obvious. Every part of the wheat, which may be called flour, was not only intended to be eaten by man, but it really makes the best bread, since that may be called the best which is of most general use, and so fine as to contain no part of the husks of the grain. But the delusion, by which so many persons are misled, to think that even the whole flour is not good enough for them, obliges them to pay a seventh or eighth part more than they need, to gratify a fanciful appetite. Had it not been for the custom of eating whiter bread than the whole of the flour will make, the miller and baker would not have employed all their art to render the bread as white as possible, and make the consumer pay for this artificial whiteness.

New Substitutes for Flour or Bread. We have, in the preceding analysis, as well as on former occasions, mentioned various substances which might advantageously be employed in the manufacture of this indispensable article of human sustenance; independently of the different kinds of grain and roots that are already made subservient to this beneficial purpose. In order to exhibit a distinct view of the most promising substitutes, whether indigenous or exotic, and especially such as have actually been used, on the authority of creditable evidence, we shall here divide them into three classes, and, in the course of the work, give a more particular account of each article, in its alphabetical order.

I. *Farinaceous Seeds* :—Wheat-grass, or *Triticum Spelta*; Millet, or *Panicum miliaceum*; Common Buck-wheat, or *Polygonum fagopyrum*; Siberian Buck-wheat, or *Polygonum tataricum*; Wild Buck-wheat, or *Polygonum convolvulus*; Wild Fescue-grass, or *Festuca fluitans*; Maize, or Indian Corn, the *Mays Zea*; Rice, or *Oryza sativa*; Guinea Corn, or White Round-seeded Indian Millet; the *Holcus Sorghum*, L.; Canary-grass, or *Phalaris canariensis*; Rough Dog's-tail Grass, or *Cynosurus echinatus*; Water Zizany, or *Zizania aquatica*; Upright Sea Lime-grass, or *Elymus arenarius*; Sea-reed, Marram, Helme, or Sea Mat-weed, the *Calamagrostis*, or *Arundo arenaria.*

The following mealy fruits, however, deserve a decided preference over many of the preceding: viz. Water Caltrops, or the fruit of the *Trapa natans*, L.; Pulse of various kinds, such as Peas, Lentils, Beans, and the seeds of the Common Vetch, Fetch, or Tare-acorns, and especially those of the *Quercus cerris* and *esculus*; the seeds of the White Goose-foot, Common Wild Orage, or the *Chenopodium album*; the seeds and flowers of the Rocket, or *Brassica eruca*; the seeds of the Sorrel, or *Rumex acetosa*; of the different species of Dock, or *Lapathum*; of the Yellow and White Water-lily, or the *Nymphœa lutea* and *alba*; of the Corn-spurrey, or *Spergula arvensis*; of the Spinage, or *Spinacia oleracea*, L.; of the Common Gromwell, or Graymill, the *Lithospermum officinale*; of the Knot-grass, or *Paniculum aviculare*; the Beech-nut (see p. 233); the husks of the Lint-seed, &c.

II. *Farinaceous Roots* : namely, those of the Common and Yellow Bethlem Star, or *Ornithogalum luteum* and *umbellatum*; of the Yellow Asphodel (see p. 130); of the Wake Robin, or *Arum maculatum* (after being properly dried and washed); of the Pilewort, or Lesser Celandine, the *Ranunculus ficaria*; of the Common Dropwort, the *Spirœa filipendula*; of the Meadow-sweet, or *Spirœa ulmaria*; of the White Bryony, or *Bryonia alba*; of the Turnip-rooted Cabbage, or *Napobrassica*; of the Great Bistort, or Snake-weed (p. 268); of the Small, Welch, or Alpine Bistort (p. 269); of the Common Orobus, or Heath-pea; the Tuberous Vetch; the Common Reed; both the Sweet-smelling and Common Solomon's Seal; the Common Corn-flag, or *Gladiolus communis*; the Salt-marsh Club-rush, or *Scirpus maritimus*, &c.—Indeed, some authors also include in this list the roots of the *Mandragora*, *Colchicum*, *Fumaria bulb.*, *Helleborus acconitifol.* and *nigr.*, *Lilium bulbif.*, and many others; but for these last mentioned we have not sufficient authority.

III. *Fibrous and less juicy Roots*: viz. those of the Couch-grass, or Creeping Wheat-grass; the Clown's, or Marsh Wound-wort (p. 31); the Marsh Mary-gold, or Meadow Bouts; the Silver-weed, or Wild Tansey; the Sea Seg, or *Carex arenarius*, &c.

Having thus stated the various substitutes for bread, which have either already been adopted with success in this country, or which might, in times of *real* scarcity, be easily converted into proper nutriment, we cannot better conclude this article than in the words of ARTHUR YOUNG, Esq. who, in his Observations on the late Royal Proclamation, recommending frugality in the consumption of corn, as one of the surest and most effectual means of alleviating the present pressure of the times, espouses the cause of the unfortunate poor, nearly in the following words: Every master or head of a family is in duty bound to second, without compulsion, the humane views of the legislature. Hence, bread made of the whole produce of the wheat, excepting only seven pounds of the bran in each bushel, and adding one-fourth or third part of a substitute, would probably be the most effective saving. If the consumption of the whole kingdom be computed at 8,000,000 of quarters in twelve months, this saving on all the wheat consumed in nine months would be 700,000 quarters, which would feed 875,000 persons, at the ordinary consumption of one quarter a head per annum; and probably be equal, under the present restrictions, to afford food to 1,000,000 of people for the next nine months.—Farther, if the saving of oats to the supposed number of 500,000 horses of luxury, be calculated only at one bushel per week, this would, in nine months, amount to 18,000,000 of bushels; or sufficient to support 1,000,000 of persons for the same period of time, allowing to each not less than twenty-five bushels per annum.—With due deference to Mr. YOUNG's statistical information, however, we beg leave to doubt whether 500,000 fat horses, crammed on the food of man, move about the kingdom; though it must be acknowledged, that *pleasure horses* "are spectacles of envy to the starving poor—abominable and scandalous spectacles, which, in times like these, ought to be removed from the view of those whose miserable children might be fed on the corn thus saved."

BREAD-FRUIT-TREE, or the *Artocarpus*, L.—a plant which grows in the South-Sea Islands, and is remarkable for the size and nutritive quality of its fruit. Although this tree has been mentioned by many voyagers, it was little noticed till the return of Captain WALLIS from the South Seas. It grows in abundance on the Ladrone Islands. In the Society Islands, it is of the size of a middling oak; its leaves are about a foot and a half in length, of an oblong shape, deeply sinuated like those of the fig-tree, which they resemble in colour; and, when broken, exude a milky juice. The fruit is shaped like a heart, and attains the size of a child's head. Its rind is thick, green, and covered with excrescences of a hexagonal figure. The internal part of the rind is composed of a pulpy substance, full of twisted fibres: this pulp becomes softer towards the middle, where a small cavity is formed, containing no kernels or seeds. The inhabitants of Sumatra dry the soft internal part, and use it as bread with other food. At Amboyna, they dress the inner rind with the milk of the cocoa-nut, and fry it in oil like fritters. It affords much nourishment, is very satisfying, and therefore proper for labouring people. Being of an astringent quality, it is also beneficial to persons of a laxative habit. Its taste is rather harsh, and similar to the potatoe-bread made in the West of England. The milky juice which issues from the trunk, when boiled with cocoa-nut oil, makes a very strong bird-lime.

From the investigations of botanists it appears, that this tree can only be propagated by suckers or layers, owing to a deficiency in the parts of fructification.

Breakstone (Chickweed). See Procumbent Pearlwort.

BREAM, or *Brama*, is a species of the *Cyprinus*, or carp. It inhabits lakes, or the deep parts of smooth rivers, and affords sport to the angler, though it is not much esteemed for its flavour. The rules for catching this fish are nearly similar to those established for taking carp in general, which will be stated under the article Carp: the tackle, however, should be finer than what is commonly used for that fish; and the angler should throw his line as nearly as possible into the middle of the stream. The bream may be taken with a blue-bottle fly, either by whipping, or in the common method, by paste or gentles.

BREAST, or fore part of the chest, signifies that cavity of the trunk which is composed of many bones, namely, the *sternum* or breast-bone in front, twelve ribs on each side, twelve *vertebræ*, or turning joints of the spine, as the body is turned upon them, and two shoulder blades. The *thorax*, or chest, extends from the lower part of the neck to the midriff, and contains the organs most essential to life, such as the heart, the lungs, and likewise the wind-pipe and the gullet. With respect to the diseases of the breast, we refer to the articles Cough and Inflammation.

Breasts, or *mammæ*, in females, are two glandular, protuberant bodies on the sides of the chest, in the most proper situation for giving food to the infant. In some instances there have been found *three*, and even *four* breasts in one person, all yielding milk alike. They are very sensible to the touch, and ought therefore to be carefully guarded against external injury; as a very slight bruise or blow may be attended with fatal consequences. No part of the human body is so easily affected by cold, and so liable to cancerous complaints, as that of the female breast.—See Cancer.

There prevails a custom of *drawing the breasts* after delivery, when the secretion of milk is so great, that from an incapacity of the child to empty, or relieve, them by early sucking, the vessels are considerably distended, and the breasts so completely filled as to occasion much pain to the mother. This practice is severely censured by the Rev. C. CRUTWELL, in his "*Advice to Lying-in Women*," published in 1779: and he is of opinion that the attempt is unnatural, as applying a different agent from that designed by Nature; and indelicate, because a disease of a malignant tendency may thus be easily communicated; while it is painful and dangerous to the patient. According to his experience, the neglect of drawing the breasts has never been prejudicial. If, says he, they were not touched during this state of fulness, hardness, or inflammation, but the whole suffered to subside, which would happen in a few hours, the child might then be safely put to the breast. It is the application of too great force in drawing them, or placing the child to suck at an improper time, and not the delay, which causes the mischief. If the infant cannot be suckled the first day, or before the hardness appears, it should be deferred till the breast becomes soft. This callosity is chiefly produced by some external injury, such as drawing the breasts, heated rooms, hot and stimulating liquors, medicines, &c. all of which contribute to excite inflammation, or increase a slight degree of irritation, so as to occasion a milk-fever, abscesses, or both.—See NIPPLES and SUCKLING.

BREATH, *fetid*, a misfortune to which many persons are liable, though they appear to be in perfect health. It may arise from various causes, the principal of which are, carious teeth, putrid gums, ulcerations of the lungs, or some peculiarity in the constitution of the individual.

If it originate from hollow teeth, care should be taken that no fragments of provisions, and especially cheese, remain in them, after eating: hence the mouth ought to be washed or properly rinsed after every meal with tepid water, or lukewarm chamomile tea. A similar precaution is necessary, when the teeth are carious, or the gums in a flaccid and spongy state: but if the lungs or other organs of respiration be diseased, due regard ought to be paid to the primary affection, of which we shall treat under the head of PULMONARY CONSUMPTION. In this case, as well as in some peculiar habits, where the real cause of fetid gums cannot be easily ascertained, the skill of the practitioner is frequently baffled; yet we shall venture to suggest a remedy which has, in a great variety of instances, been attended with the desired effect. Many persons afflicted with that disagreeable complaint are, also, subject to habitual costiveness, which cannot, in general, be relieved without administering laxatives: these, by relaxing the bowels, ultimately tend to injure the constitution. On the other hand, we have observed from experience, that finely powdered charcoal, newly prepared, and kept in close vessels, has a remarkable tendency to open the bowels, without inducing an extraordinary degree of weakness, especially if it be mixed with the syrup of yellow roses. For this purpose, a table-spoonful of each, diluted with a little water, should be taken two or three times every day, according to circumstances. Thus, if the patient abstain, for some time, from the use of animal food, the most distressing costiveness may be gradually relieved with perfect safety to the constitution; while the carbon acts on the whole system as the most effectual antiseptic with which we are acquainted. To increase the effect of this mild medicine, a tea-spoonful of squill vinegar may occasionally be added to each dose, together with a little cinnamon or other aromatic water.

The best palliatives for sweetening an offensive breath, are gargles consisting simply of lime-water; or a decoction of the Peruvian bark; or a liquor made by mixing two ounces of compound alum-water, and half an ounce of essence of lemons, with three ounces and a half of fennel-water, which should be frequently used previous to going into company,

BREATHING, is that alternate contraction and expansion of the lungs and breast, by which animals inspire and expire the surrounding atmosphere; a process essentially necessary to the support of life. From the moment a child enters the world, the air penetrates into its lungs, which were previously filled with a watery mucus, but are then opened for the circulation of the blood. Thus respiration, one of the primary and most important of the vital functions, commences with birth, and is incessantly active; as it cannot be interrupted for many minutes, without endangering the life of the individual

There have, indeed, been instances of persons wantonly endeavouring to restrain the act of breathing, nay even to check the pulsation of the arteries, so as to exhibit a specimen of apparent death, for several minutes. We still remember the account of such a hazardous experiment related by a most respectable professor in the University of Edinburgh, who informed his pupils, that a man possessing the talent here alluded to, at length paid the price of his life, by remaining, in one of his exhibitions, a fatal example of his temerity.

More frequent, however, though not so immediately dangerous, are the instances in which persons, in other respects sensible, unthinkingly expose themselves to situations, where they must necessarily breathe the most vitiated and pernicious atmosphere. Such is the case in all public assemblies, which are confined in narrow limits, particularly in theatres and other places of amusement, to which numbers of spectators indiscriminately resort, and where each individual is obliged to respire part of the aggregate mephitic vapours of the company. Far from wishing to discourage the frequenting of those fashionable places of resort, in general, we only think it our duty to warn such invalids, as are liable to athmatic or pulmonary complaints, against a too free indulgence in these enticing amusements. Indeed, we are convinced, by numerous facts, of their deleterious influence; and if any person be disposed to doubt the propriety of this caution, let him reflect on the dreadful effects frequently produced by shutting up 5 or 6 passengers in a stage-coach, only during a short space of time; and he will acknowledge that our admonition is well founded. Hence we would advise those who lead a studious or sedentary life, never to continue for several hours together in a close and perhaps low apartment, where they admit the same air to re-enter the lungs, which has before been respired, and has become at length totally unfit for supplying the vital principle. Thus, they deprive themselves of the most beneficial cordial of life, namely, *fresh air*, and exhaust the source of vitality as much in one hour, as was perhaps destined by Nature for the support of weeks, or even months. Instead of following such an irrational practice, they ought either to remove to another atmosphere, or to open the window or door, to admit a supply of pure air, rather than to destroy themselves by an obstinate or indolent perseverance in their former habit.

BREECHES, a part of the dress of most Europeans, worn by males, and reaching from the waist to the knees. The Romans had no dress corresponding with our breeches. This article appears to be a habit peculiar to the barbarous nations of the North: they were worn by the ancient Gauls, Germans, and Britons; and were also introduced into Italy, as early as the time of Augustus, where they afterwards grew so fashionable, that Honorius and Arcadius thought proper to restrain them by a law, and to expel the breeches-makers from Rome, under the idea that it was unworthy a nation which ruled the world, to wear the apparel of barbarians.

With respect to the construction of this article of our dress, it may be useful to observe, that if made too tight in the waistband, or of improper materials, they must necessarily occasion uneasiness, and prove injurious to the body. The form most to be preferred, and now very generally adopted, is that of pantaloons: these ought to be of a sufficient width, of a thin substance in summer, and of warm cloth in winter. Breeches made of leather, and so narrow as to fit exactly the shape of the limbs, are liable to many inconveniencies: they benumb the hips and thighs, occasion a painful pressure upon the parts, especially the abdomen; and, by the close texture of the leather, in a great measure impede perspiration.

BREEDING *of Cattle*: As the different circumstances to be attended to in the management of cattle, will be stated when treating of the various kinds of useful animals, we shall here only observe, that the first thing to be considered is *beauty of form*; the next is proportion of parts, or what may be called *utility of form*; the third, which has engaged the attention of midland breeders, is the texture of the muscular parts, or what is called *flesh*; a quality which, however familiar it may have been to the butcher and consumer, has not in general been attended to by breeders. In short, it is a rule applicable to all sorts of live-stock, to breed from straight backed, round bodied, clean, small boned, healthy animals; carefully rejecting such as have roach backs and heavy legs, with much external appearance of offal, &c.

To the late Mr. Bakewell, of Dishley, who was undoubtedly the most scientific breeder of his time, we are indebted for many new and important improvements in the art breeding cattle. His principle was, to procure the best beast, that would weigh most in the valuable joints; and thus, while he gained in point of shape, he also acquired a breed much hardier, and easier fed, than any other.

With respect to the breed of

oxen, Mr. Bakewell asserts, that the smaller the bones, the more perfect will be the make of the beast, and the quicker it will fatten. The breed preferred, and considered by him as the best in England, is that of Lancashire. The shape which should be the criterion of a cow or bull, an ox, or a sheep, is that of a hogshead, or a firkin, with legs as small and short as possible. He found from various experiments in different parts of the kingdom, that no land is too *bad* for a *good* breed of cattle, and particularly of sheep. The great advantage arising from his breed is, that the same quantity of food will suffice them, much longer than it will any other kind; besides which, the wool is of the finest quality, and the sheep stand the fold perfectly well.

The wintering of cattle, also received particular attention from this professional breeder: his horned beasts were tied up during the winter, in sheds, and fed with straw, turnips, or hay; all the lean beasts were fed with straw alone, and lay without litter. Young cattle, that require to be kept in a thriving state, are fed upon turnips; and as the spring advances, and this vegetable becomes scarce, hay is their only food.

The floors, on which the cattle stand, are paved, and raised six or eight inches above the level of the yard; and each crib being only broad enough for a beast to stand on, its dung falls on the lower pavement; by which contrivance it is kept perfectly clean without litter.

Breeding *of Fish.* The necessary qualities of a pond for breeding fish, are very different from those which are requisite to make it serve for their nourishment. A good breeding pond is more rare to be met with than a good feeding one. The best indications of the former, are plenty of rushes and grass about its sides, with gravelly shoals like those of horse-ponds. The quantity of the spawn of fish is prodigious; and where it succeeds, one fish may sometimes produce millions. Hence two or three melters, and as many spawners, placed in such a pond, will, in a short time, stock a whole country. If it be not intended to keep these ponds entirely for breeding, but to let the fish grow to a considerable size, their numbers should be thinned, or they will otherwise starve each other. Different kinds of fish may also be added, which will prey upon the young, and prevent their increasing in number. For this purpose, eels and perch are most useful, because they not only feed upon the spawn itself, but also upon the young fry. Some fish will breed abundantly in all kinds of waters; of this nature are the roach, pike, perch, &c.

Breeding, *Good*; an expression which is used to denote the proper deportment of persons in the external offices and decorum of social intercourse.

Good breeding necessarily implies *civility*; though a person, without being well bred, may be civil: the one is the result of good-nature; the other, of good sense joined to experience, observation, and attention.

The most perfect degree of good breeding is only to be acquired by great knowledge of the world, and keeping the best company. To attain this desirable object, we would advise parents not to suffer their children, after a certain age, to spend the greatest part of their time among servants, or menial dependents; from whom neither good language nor proper manners can be expected; and who seldom fail to instruct the susceptible young mind in all the low cunning, and artifices of the vulgar. Good-breeding adorns and enforces virtue and truth; it connects, it endears, and while it indulges the just liberty, restrains that indecent licentiousness of conversation, which alienates and provokes. Great talents render a man famous; great merit procures respect; great learning, esteem: but good-breeding alone can ensure love and affection. Hence it deserves to be peculiarly recommended to women, as the greatest ornament to such as possess beauty, and the safest refuge for those of a contrary description. It facilitates the conquests, and decorates the triumphs of beauty; while, on the other hand, it atones, in some degree, for the want of that quality. On the whole, good-breeding is attended with so many advantageous effects, that, though it cannot be called a virtue in itself, it may be jusly considered as one of the most pleasing and useful accomplishments; inasmuch as it has a direct tendency to check the violence of all the turbulent passions, and to render the path through life more comfortable and easy.

BREWING, the art of preparing beer or ale from malt, by extracting all its fermentable parts in the best manner; by adding hops in such proportions as experience has shewn, will preserve and meliorate the extracts; and by causing a perfect fermentation in them, by means of yeast and barm. One of the most approved methods of performing this operation, is as follows:

Take of the purest and softest water you can procure, as much as you will have occasion for; boil it, put it into large tubs, and let it stand exposed to the air to purge itself, at least one week. Grind a sufficient quantity of the best brown, high-dried malt; let it remain four days before you use it, that it may mellow, and dispose itself for fermentation. Fill a copper with your prepared water, and let it boil; then lade about three-quarters of a hogshead into the mash-tub, filling the copper up again, and making it boil. When the water in the mash-tub is cooled to such a degree, that, in consequence of the stream subsiding, you may *see your face in it*, empty into it, by degrees, nine bushels of the malt, mash it well, and stir it about with the rudder near half an hour, till it is thoroughly wetted, and incorporated with the water: then spread another bushel of malt lightly over its surface, cover the whole with empty sacks to keep in the steam, and leave it for an hour.

At the end of the hour, the water in the copper being boiling, damp the fire, and let the water cool a little as before: then lade as much as is necessary on the mash, till the whole together will yield about a hogshead of wort. When this second quantity of water is added, stir it again well, cover it, and leave it for another bour. Then let the first wort run in a small stream into the under back, and lade another hogshead of hot water on the mash: stir it again as before, cover it, and let it remain for two hours.

In the mean time, return the first wort into the copper, and put into it six pounds of fine brown seedy hops, first rubbing them between the hands. Then make a brisk fire under your copper, till the liquor boils; let it continue to boil till the hops sink; then damp the fire, and strain the liquor into coolers. When it is about as warm as new milk, mix some yeast or barm with it, and leave it to work till the surface appears in curls; then stir and mix the whole properly with a hand-bowl, and let it again ferment. Repeat the stirring with the bowl three times, then tun it, and leave it to work in the hogshead. When it has nearly done working, fill up the cask, and bung it, but let the vent-hole remain open.

Beer thus brewed, though brown, will be as clear as rock-water, and will keep for any length of time.

Set the second wort aside for the next brewing, which, as far as wetting the mash, must be managed exactly in the same manner as the first; but afterwards, instead of water, heat the second wort of the first brewing, and lade it on the mash, which will give the new wort additional strength and softness. Make the second wort of the second brewing with water, and save it for the first wort of the third; and so on for as many brewings as you please. A third wort may be taken from the first brewing, which should be heated and laded on the mash of your second brewing, after taking off the second wort; and thus an additional hogshead of very good mild beer may be procured.

On taking a review of the above process, and the multiplicity of circumstances to be attended to, it is easy to see that the operation of brewing is of a very precarious nature; and requires great skill and dexterity to manage it with complete success. The goodness of the beer will depend on the quality of the malt from which it is made; on the peculiar properties of the water with which it is infused; on the degree of heat applied in the mashing; on the length of time the fusion is continued; on the due manner of boiling the wort, together with the quantity and quality of the hops employed; and on the proper degree of fermentation: to ascertain all which particulars, with precision, constitutes the great mystery of brewing, and can only be learnt by experience and repeated observation.

Mr. MILLS, in his "*System of Practical Husbandry*," and Mr. COMBRUNÉ, in his "*Theory and Practice of Brewing*," give the following directions for the choice of materials used in brewing, and for conducting the whole process:

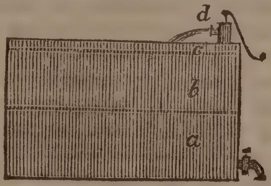
1. *Of the Water.* Pure rain-water, as being the lightest, is esteemed the most proper. Well and spring waters are commonly hard, and consequently unfit for drawing the tincture completely from any vegetable. River-water, in point of softness, is next to rain-water: and even pond-water, if pure, is equal to any other for brewing.

2. *Of Malt.* Those malts are to be preferred for brewing, which have been properly wetted and germinated, then dried by a moderate heat, till all the adventitious moisture is evaporated, without being blown, vitrified, or scorched, by too hot or hasty fires. For, the better the malt is dried, the sounder will be the beer brewed from it, and the longer it will keep. In order to ascertain the quality of this article, bite a grain of it asunder, and if it tastes mellow and sweet, breaks

soft, and is full of flour from one end to the other, it is good; which may also be known by its swimming on the surface, when put into the water. The best way of grinding it, is to bruise it in a mill composed of two iron cylinders. These break the malt without cutting its husk, so that the hot water instantly pierces its whole substance, and soon draws forth a rich tincture, with much less mashing than in the common way.

3. *Of Hops.* Experience has proved, that hops slack-dried, or kept in a damp place, are pernicious ingredients for making beer; and likewise, that they yield their aromatic bitter more efficaciously, when boiled in wort than in water: hence, to impregnate the extracts from malt with a due proportion of hops, their strength, as well as that of the extract, should previously be ascertained. The newer the hops are, the better they always prove; the fragrance of their flavour being in some degree lost by keeping, notwithstanding the care used in preserving them. Private families, who regard only the flavour and salubrity of their malt liquors, should use from six to eight bushels of malt to the hogshead of their strongest beer. The quantity of hops must be suited to the taste of the drinker, and to the time the liquor is intended to be kept. From two to three pounds will be sufficient for a hogshead, though some go as far as six pounds.—Mr. Mills is of opinion, that *small beer* should always be brewed by itself; in which case, two bushels and a half of malt, and a pound and a half of hops, are sufficient to make a hogshead.

4. *Of the Vessels used in Brewing.* The brew-house itself, and every vessel in it, ought to be perfectly clean and sweet; for if the vessels are in the least degree tainted, the liquor put into them will contract a disagreeable scent and taste. A vessel of the most simple and excellent contrivance, among the multiplicity of brewing utensils adapted to family purposes, is that of Mr. J. B. Bordley, an ingenious American, who has described it in his "*Essays and Notes on Husbandry and Rural Affairs*;" (Philadelphia, 1799.) He terms his process, by way of distinction, *a tripartite method of brewing*; because the *kettle-apparatus*, represented in the subjoined cut is worked in *three* divisions. The whole vessel is 40 inches long, 20 broad, and 24 deep: namely, division *a*, is thirteen; *b*, nine; and *c*, two inches deep. The dotted lines are marked, where the perforated moveable bottoms are placed.—In *a*, is the *water* or *wort*; *b*, contains the *malt*; and into *c*, the hot water is pumped up, or poured over from *a* to *c*, by means of the small pump, *d*; and thus passes through every particle of the malt; so that, by frequent agitation, the water in a manner washes out its whole substance, and extracts all its farinaceous and saccharine ingredients. This operation is repeated, occasionally stirring up the grains, till the liquor becomes clear; when it should be briskly boiled (see the



subsequent directions), and then drained off into coolers. Mr. **Bordley** ingenuously acknowledges, that a Swedish method of brewing in camp afforded him the hint for this invention. He also observes, that his tripartite kettle is made of copper, and the small pump of *metal*; though we are inclined to think that, for the latter, wood, or *pure tin*, would be preferable to brass, in order to prevent the formation of verdigrise. At the bottom is a cock in one side of the vessel. On the whole, we consider this as the most proper and convenient piece of machinery, ever contrived for family-brewing.

5. *Of the heat of the water for Mashing.* Particular care should be taken, that the malt be not put into the water whilst boiling hot. In order to bring the water to an exact heat, Mr. **Combrune** advises us, to put on the fire 22 quarts, gallons, or barrels, according to the quantity wanted; and when it has just arrived at the boiling point of the thermometer, to add 10 similar measures of cold water, which, when mixed with the former, will be of a temperature not exceeding 161° of Fahrenheit: and this he considers as the most proper heat for mashing. He farther remarks, that water which has endured the fire the shortest time, provided it be hot enough, will make the strongest extract.

6. *Of Mashing.* When the water is brought to a due heat, the malt is to be put in very leisurely, and uniformly mixed with it.

7. *Of boiling the Wort.* As the design of boiling the wort is to clear the liquor of its impurities, and to obtain the virtue of the hop, a much shorter time than usual is sufficient. Long boiling of the hop is a most pernicious practice, and produces an austere, nauseous bitter, but not a pleasant aromatic one. Instead of adding the hops to the wort, when this is put into the copper, or before it boils, they may be infused about five minutes before the wort is taken off the fire: if this is not sufficient to give the desired degree of fragrant bitter, ten minutes may be taken, or as much longer as will be found necessary. Mr. **Mills** prefers putting the hops to the wort towards the latter end of the boiling, rather than at the beginning, because the continued boiling of the liquor is apt to dissipate their fragrance.

8. *Of Fermentation.* One gallon of yeast, in the coldest fermenting weather is, according to Mr. **Combrune**, sufficient to ferment the extract from one quarter of malt; and, if properly managed, will yield two gallons of yeast. Great care should be taken in the choice of yeasts, as they are liable to be soon tainted, and very readily communicate their infection to the liquors fermented. The whole process of fermentation should be carried on in the slowest and coolest manner; so that the temperature, which at the commencement was between 40 and 50° of Fahrenheit, should very gradually be raised to the 70th degree. Fermentation will always succeed best, where the air is purest.—If too hot water has been employed for obtaining strong and fatty extracts, from the malt, fermentation will be retarded: on the contrary, in weak extracts, it is so much accelerated, that the whole soon becomes sour. When the fermentation is at its height, all the feculent matter, or foul yeast, which rises on the surface, must be carefully skimmed

off, whatever be the quality of the liquor. The beer, as soon as it is tolerably clear, should be racked off into perfectly clean and sweet casks; and, when managed in this manner, will remain a long time in a state of perfection.

9. *Of fining the Liquor.* As the excellency of all fermented liquors depends, in a great measure, on their transparency, it often becomes necessary to resort to artificial means, in order to bring them to this state of perfection, if the process of fermentation has been mismanaged. Thus, a solution of isinglass in stale beer, is used to fine and precipitate other beers: but, as this method has proved ineffectual in brown beers, we are informed by Mr. COMBRUNE, that brewers "*sometimes put one pound of oil of vitriol* into *one butt*, though four ounces should never be exceeded in that quantity." On this subject we refer the reader to p. 239 of our work.

10. *Of the distempers of Malt Liquors.* Among the distempers incident to beer, one, which has been found most difficult to cure, is that of its appearing ropy. A bunch of hyssop put into the cask will, however, effectually remedy this evil.—A satisfactory account of the different methods of recovering *flat*, *tart*, or *sour beer*, having been already given in this Encyclopædia, p. 240 and 241, it would be superfluous to repeat it in this place.

It deserves to be remarked, that *brown* beer, made from well-dried malt, is, in the opinion of Mr. COMBRUNE, less heating than *pale* beer, brewed from slack-dried malt. If extracts from pale malt be made with very hot water, they will keep sound for a long time; but those obtained from brown malt, with too cold water, will frequently turn sour.

Having thus afforded an analytical view of this important subject, we shall conclude it with an account of the latest patents, which have been granted to those who have contributed, or attempted to improve, the Art of Brewing.

In March, 1788, Mr. W. KER, of Kerfield, Tweedale, received the King's patent for his improvement in brewing ale, beer, porter, and other malt liquors, so as to save a considerable portion of hops, to produce the liquors of a superior flavour and quality, and render them less liable to become acid or putrid. The steam which arises from the boiling copper, is known to be strongly impregnated with the essential oil of the hops, in which their flavour consists. Instead, therefore, of allowing it to escape and evaporate, as it does in the common mode of brewing, Mr. KER contrives to preserve and condense it, by means of a winding-pipe fixed to the copper, similar to the worm of a still, or by a straight pipe passing through cold water, or any other cooling medium. The oil and water, thus obtained, are returned into the worts, when boiled; or the oil, after being separated from the water, along with which it had been exhaled, is returned into the worts after they are boiled; and the watery part, which, after the oil is separated, still continues impregnated with the aromatic taste and bitter of the hop, is returned into the next copper or boiling vessel, and so on, from one copper or boiling vessel into another. By this process, a considerable part of the hop and flavour, which is lost in the ordinary mode of brewing, is preserved; the flavour of the liquor is improved by the preservation of the finer parts of the aromatic oil; and the ale and beer are better secured from any tendency to acidity or putrefaction, and therefore must be fitter for home consumption and exportation.

In June, 1790, Mr. JOHN LONG, of Ireland, obtained a patent for an improvement, which he calls *an entire new method*, in *all the essential parts*, of brewing good malt liquor. Though his method, in one respect, is similar to that adopted by Mr. KER, yet, as it comprehends the whole process of brewing, we shall lay it before our readers, nearly in the words of its author.

1. For the better extracting the virtues of malt, place near a mash-tun a shallow copper, or other vessel, that will readily heat, the curb of which to be on a level with the tun, and to contain from two to six hogsheads, according to the dimension of the tun, more or less; and, at the lower end of the copper, have a cock, from two to five inches in diameter, to conduct the heated liquor from the copper into a tube, which passes down the external part of the tun, and enters it through an aperture about six inches from the bottom; then forming two revolutions, more or less, through the body of the tun, and communicating its heat to the wort as it passes through the tube; and then, at a convenient distance from the place where it first entered, it runs from the tun into a cistern or tub, situate as near as convenient to the copper or heating-vessel. In the tub or cistern is to be placed a pump, for the purpose of conveying the cooler liquor back to the copper or heating vessel again, there to receive the heat of 208 degrees, more or less (which it will require after the first half hour), and then convey it through the mashing-tun, as before, and in the same manner, as long as the working brewer may think necessary, to raise the mashing-tun to any degree of heat required. By adhering to the foregoing process, the first liquor may, with the greatest safety, be let upon the malt, from 20 to 30 degrees lower than the present practice; by which means it operates with gentleness, opens and expands the malt, and prepares it for the reception of sharper or warmer liquor, so as to extract the whole of the saccharine quality from the malt. By the foregoing method, the mashing-tun, instead of loosing its first heat (which it does by the present practice), continues to increase in heat every moment, by conveying the heated liquor through the tube into the tun; by which means, at the end of two hours, the working brewer can have the tun brought to any degree of heat he shall think best suited to the different qualities of the malt. Persons who would wish to save expence, may heat their mashing-tun at the side or bottom, by a large piece of metallic substance made fire-proof, and fixed therein; which, in some degree, will answer the end proposed, but with great trouble and delay.

2. To prevent the wort from receiving a disagreeable flavour, while in the under-back, a tube must be placed at the cock of the mashing-tun, to receive the wort as it comes off, and convey it to a great cistern, or refrigeratory, which is supplied with a stream of water. The wort, passing through that medium in a spiral tube, soon loses that heat which so often

proves prejudicial to the brewer in warm weather: it is then poured from the tube into a vessel in which pumps are placed, to return the worts into the copper, for the purpose of boiling off.

3. As the great object of long boiling the wort is remedied, by this invention of taking the extract from the hops in a separate manner from the worts, Mr. Long boils the latter no longer than from fifteen to twenty minutes; and, by pursuing that method, he saves much time and fuel, and regulates the length of time accordingly.

4. He steeps his hops, the preceding day to which they are to be used, in a copper or other vessel, with as much fluid, blood-warm, as will cover the hops; where it is to remain over a slow fire at least fourteen hours, close covered; the copper, at the tenth hour, not to be of a greater heat than 175 degrees, continuing slow until the last hour. Then he brings the copper gradually to a simmer, or slow boil; in which state he suffers it to remain about ten minutes, and then runs off the fluid; and this he does at the same time the first wort is boiled off, that they may both pass together through the refrigeratory, into the fermentation or working-tun. After the foregoing operation, he covers the hops again with other liquor, brings the copper to boil as soon as convenient, and lets it remain in that state a considerable time, until the second worts are boiled off. Then he passes the hop-fluid with the wort, the same as in the first instance; and, if there is a third wort, he boils the hops a third time with small worts, and drains off the liquid as before; by which means he gradually obtains the whole of the essential oil and pleasant bitter from the hops, which is effectually preserved in the beer.

5. When the wort is boiled off, it is conducted from the cock of the copper or boiler into a tube of a proper dimension, which passes the wort from the cock to the large cistern or refrigeratory, and there performs several revolutions, in a spiral manner, through the same tube; which is immersed in a constant supply of cold water, where it loses the greatest part of its heat in a short time, and thence continues a straight course through the tube, a little elevated, and of a suitable length, placed in brick-work, until it meets a small refrigeratory, supplied with colder water from a reservoir made for that purpose, at the head of the works; whence a continual stream runs on the surface of the tube down to the great refrigeratory, cooling the wort as it passes, in order to enable the working brewer to send it into the backs, or working-tuns, at whatever degree of heat he may think proper. The tubes may be made of lead, or any other metallic substance.

6. To enable him to brew in the warm summer months, Mr. Long sinks the backs, or working-tuns, at least to a level with the ground, but if deeper the better, and covers them closely by an arch made of bricks, or other materials, that will totally exclude the atmospheric air. He then places them as near as possible to a spring or sand-drain, as their depth will naturally draw the water thence, which must be so contrived as to pass or flow round the backs or tuns. Next, he introduces a large tube, which passes through the tuns, and keeps the wort several degrees lower than can possibly be done by the present practice; by which means he pro-

duces a complete fermentation, even in the dog-days.

7. In cold or frosty weather, if the tun and backs should lose the first heat, intended to be conducted through the process by the foregoing method, a supply of warm or boiling water may be conveyed by the tube, which passes through the body of the backs or tun, communicating its heat, which rises to any degree the working brewer shall think proper: by pursuing this method, in the coldest season, a fermentation may always be procured.

In February 1798, Dr. Richard Shannon obtained a patent for his method of improving the processes of brewing, distilling, boiling, evaporating, raising, applying and condensing steam or vapour from aqueous, spirituous, saccharine, saline and other fluids. The principle of his invention consists chiefly in the following arrangement: By covering and making the mash-tun air-tight, and casing it round, under and over, with a steam-tight casing, so that, during the mashing and soaking of the malt and grain used, the heat may be preserved, or raised and regulated to any pitch, by the application of steam, both in and between the casing of the mash-tun; by which contrivance, the whole of the *farina* and substance of the grain may be as effectually extracted in one, or at most in two mashings, as is now done in three or four. The steam, conducted by a proper tube or pipe, is to be also employed for sweetening and cleansing all the brewing, distilling, and vinegar-making utensils, and casks employed in each, &c. so as in future to prevent furring, foxing, &c. even in the inmost crevices.

In June 1798, the same patentee, in partnership with Mr. Robert Burnett, of Vauxhall, procured another patent, for the discovery of a principle and invention of a method of improving the process of fermentation, by which porter, beer, ale, malt and molasses wash, wine, cyder and all other saccharine and fermentable fluids, may be conducted with certainty through the vinous process of fermentation in mild, warm, hot, and cold weather, without being materially injured as heretofore, by the different changes of the atmosphere, &c.—But as these improvements depend on the application of an expensive *pneumatic apparatus*, which does not appear to us adapted to the use of families, we refer the reader to the tenth and fourteenth volumes of the "*Repertory of Arts and Manufactures*," where he will find a detailed specification of both patents.

The last patent we shall mention, is that of Mr. Thornton, of East Smithfield; which, being dated April 15, 1778, is earlier than either of the preceding, and does not strictly relate to the process of brewing, as his invention consists in a new method of reducing *malt* and *hops* to an essence or *extract*, from which beer may be made either at sea or in distant countries. The whole is managed by the transmitted heat of compressed vapour of boiling water, and a proper apparatus for that purpose. This apparatus may be made of iron, tin, or copper: it consists of a boiler of any dimensions, a double vessel, and conducting tubes. The double vessel consists of one vessel placed within another, and fitted tight at their rims. The upper vessel forms the upper part of the under vessel, and contains the liquor to be evaporated. The under vessel is every where inclosed, except at an aperture communicating with the boiler, and at another aperture communicating with the conducting tubes; and is constructed so as not to allow any part of the vapour condensed into drops within it to escape, except back again into the boiler: it is not so extensive as to act as a common refrigeratory, and yet is capacious enough to prevent the liquor boiling over. The aperture communicating with the boiler, is large enough to freely admit the vapour from the boiler into the under vessel; and the aperture communicating with the conducting tubes, is of a proper size to allow of the vapour in the under vessel being compressed, to a degree capable of transmitting to the liquor to be evaporated a proper heat, and at the same time to serve as a passage for more heat than is necessary to keep up that degree of compression. The conducting tubes are to convey this superfluous heat or vapour, to be used for farther purposes, or immediately out of the building.

Those of our readers who are desirous of farther information on the subject, may consult the last edition of "*Philosophical Principles of Brewing*," by Mr. RICHARDSON, of Hull; a work of acknowledged merit, and practical utility.

BRIAR, the Sweet, or *Rosa rubiginosa*, L.; by HUDSON and DUROI called *Rosa eglanteria*, is a well known indigenous plant, found in hedges and on heaths. It grows to the height of five or six feet, having green branches, armed with prickles. See WITH. 466.—The varieties of this species are the common single-flowered, semi-double-flowered, double-flowered, blush double-flowered, and yellow-flowered. This shrub deserves to be cultivated in every garden, on account of the odoriferous property of its leaves. The best places for planting it, are the borders contiguous to walks, where it will profusely emit its refreshing fragrance. The young branches of the sweet-briar are a rich addition to the odour of nose-gays and bough-pots. The blossoms of this shrub are constantly visited by bees, and the leaves are used on the Continent, in tanning soft leather.

Wild Briar, or *Hep-Tree*. See the more general name of DOG-ROSE.

BRICK, a mass of clay formed into oblong squares, and dried in the open air, or burnt in proper kilns, to serve the various purposes of building.

English *statute-bricks* ought, when burnt, to be nine inches long, four and a quarter broad, and two and a half thick: they are commonly used for paving cellars, sewers, sinks, hearths, &c. There is, however, a great variety of bricks, in consequence of their different forms, dimensions, uses, and the method of making them.

On comparing the strength and durability of modern bricks with those of the ancients, it is evident that the former are in every respect inferior; and that we are either unacquainted with the exact materials of which those admirable productions of art are composed, as well as with the proper manner of preparing them; or that this useful manufacture has been shamefully neglected, while our masons and brick-makers are little concerned about the quality of their materials, if they can obtain them in a cheap and expeditious manner. Such appears to be the tendency of the patents that have, from time to time, been procured by various *scheming men*, who are generally ignorant of the first principles of chemistry, on which the successful practice of this important branch of the arts chiefly depends. In order to afford a concise view of the subject, we shall premise an analysis of the requisites of a proper *clay* for making bricks; then state a few rules applicable to practice in all situations; and conclude with a general account of the late inventions, for which the King's patent has been granted: by which means the reader will be enabled to ascertain their respective merit.

It is an erroneous notion, that bricks may be made of any earth that is not stony, or even of sea-ouse; for those only will burn red, which contain iron particles. In England, they are chiefly made of a motley, yellowish, or somewhat reddish, fat earth, vulgarly called *loam*. Those of Stourbridge clay, and Windsor-loam, are esteemed the most proper and durable bricks; such as will stand the greatest degree of heat, without melting. In general, the earth for this manufacture ought to be sufficiently fine, free from pebbles, and not too sandy; which would render the bricks heavy and brittle; nor too fat, which would make them crack in drying. Nor should it contain too many calcareous and ferruginous ingredients; as the former prevent the mass from becoming firm in burning, and occasion the bricks to crumble, when exposed to the air; while the latter, or iron particles, retard the preparation of bricks, insomuch that it is sometimes impossible to give them due consistence: this inconvenience, however, may be remedied, by allowing the clay to lie for a considerable time under the influence of the atmosphere, then soaking it in pits, and afterwards working it well, in the usual manner. — The common potter's clay, which is also employed for the manufacture of bricks, is opaque, imparts a slight colour, sometimes yellowish, blueish, greenish, but more frequently of different shades of light-grey, excepting that of blue, which is always dark: by kneading and spreading such clay, it becomes smooth and glossy; it is soft, fat, and cold, though agreeable to the touch, slightly adheres to the tongue, and, when of the best quality, it should neither be too light nor too heavy. Its constituents chemically examined, are found to consist of *thirty-seven* parts of pure argillaceous or clayey earth, and *sixty-three* parts of silicious or flinty earth.

Whoever is desirous of producing the best and most durable kind of bricks, ought to attend to the following rules: 1. Clay of every description, whether fat or lean, whether more or less mixed with particles of lime, iron, &c. must be dug after Midsummer, that is, between the beginning of July and latter end of October, before the first frost appears: it should be repeatedly worked with the spade, during the winter, and not formed into bricks till the following spring. 2. The clay, before it is put into pits for soaking, must be broken as small as possible, and allowed to lie at least ten days: every stratum of twelve inches should be covered with water, as in this manner it will be more uniformly softened. 3. Two such pits, at least, will be necessary for every brick-manufactory,

factory, so that after having been suffered to remain for five days, the second may be prepared, and thus the manufacture carried on without interruption. 4. The next step is that of treading and tempering the clay, which requires double the labour to what is usually bestowed on it; as the quality of the bricks chiefly depends upon the first preparation. If, in tempering them, too much water be used, they become dry and brittle; but, if duly tempered, they will be smooth, solid, and durable. Such a brick requires nearly as much earth as one and a half made in the common way, when too great a proportion of water is added; in which case the bricks become spongy, light, and full of flaws, partly through neglect in working them properly, and partly by a mixture of ashes and light sandy earth (as is generally practised in the vicinity of London), with a view to dispatch and facilitate the work, as well as to save culm or coals in the burning. 5. Bricks made of proper earth, being more solid and ponderous, require a much longer time for drying than those made in the common way; they ought not to be removed to the kiln, till they have become lighter by one half, and give a hollow sound on collision; because the proper drying of bricks will prevent them from cracking and crumbling in the kiln. 6. Of whatever materials the kiln be constructed, each burning of from 6 to 10,000 bricks requires that the fire be kept up for 24 hours, and double that time for a number of from 12 to 50,000. The uniform increase of heat deserves great attention; the duration of it should be regulated according to the seasons; and, during the last 24 hours, the fire should be uninterruptedly supported by means of flues; but afterwards the kiln must not be suddenly closed; as there is always some danger of bursting the flues, or melting the bricks.

It would be useless here to enter into particulars relative to the manner of burning bricks in the neighbourhood of London; we shall therefore only observe, that they are chiefly burnt in *clamps* built of the bricks themselves, after the manner of arches, in kilns, with a vacancy between each brick to admit the passage of the fire, but with this difference, that instead of being arched, the bricks project one over another on both sides of the space, for laying in the wood and coals till they meet, and are bounded by the bricks at the top. The place for the fuel is carried up straight on both sides, till about three feet high, when it is almost filled with wood, over which is laid a stratum of sea-coal, and then the arch is spanned over. Farther, sea-coal is also strewed over the clamp, between all the rows of bricks; and lastly, the wood is kindled which also communicates with the coals; and when the whole is consumed, the manufacturer concludes that the bricks are sufficiently burnt.

Among the multiplicity of patents lately obtained for the making of bricks, it is somewhat singular, that the inventors confine their lucrative views chiefly to the formation of this useful article, without paying much regard to the materials of which it may be composed. Of this nature are the patents granted to the following individuals:

1. Mr. EDMUND CARTWRIGHT, of Doncaster, for his invention of a new principle, on which

bricks, stones, or any other building materials to be substituted for those articles, may be so formed, as to be applied with peculiar advantage in the erection of walls, and in the construction of arches. (Dated April 14, 1795.) His improvement consists in giving bricks such a shape or form as that, when in work, they shall mutually lock into, or cramp each other. The principle of his invention, he says, will be readily understood, by supposing the two opposite sides of a common brick to have a groove or rabbet down the middle, a little more than half the width of the side of the brick in which it is made; there will then be left a shoulder on each side of the groove, each of which shoulders will be nearly equal to one quarter of the width of the side of the brick, or to one half of the groove or rabbet.—Buildings constructed with bricks of this principle, will require no bond-timber, one universal bond running through, and connecting the whole building together; the walls of which can neither crack nor bulge out, without breaking through the bricks themselves. When bricks of this simple form are used for the construction of arches, the sides of the grooves or rabbets, and the shoulders, should be the radii of the circle, of which the intended arch is to be the segment. In forming an arch, the bricks must be coursed across the centre on which the arch is turned, and a grooved side of the bricks must face the workman. They may be either laid in mortar, or dry, and the interstices afterwards filled, and wedged up, by pouring in lime-putty, plaster of Paris, grouting, or any other convenient material, at the discretion of the workman, or builder. It is obvious, that arches upon this principle, having no lateral pressure, can neither expand at the foot, nor spring at the crown, consequently they will want no abutments, requiring only perpendicular walls to be let into, or to rest upon; and they will want no incumbent weight upon the crown, to prevent their springing up; a circumstance of great importance in many situations, in the construction of bridges. Another advantage attending this mode of arching is, that the centres may be struck immediately; so that the same centre (which in no case need be many feet wide, whatever may be the breadth of the arch) may be regularly shifted, as the work proceeds. But the greatest and most striking advantage attending this invention is, the absolute security it affords (and at a very reasonable rate) against the possibility of fire; for, from the peculiar properties of this arch, requiring no abutments, it may be laid upon, or let into, common walls, no stronger than what are required for timbers, of which it will preclude the necessity, and save the expence.—For a more particular account, we refer the reader to the third volume of the "*Repertory of Arts and Manufactures*," p. 84, and following, o which he will also find annexed two plates illustrating the subject.

2. Mr. Francis Farquharson, of Birmingham, obtained a patent (dated Febr. 20, 1798) for machinery for making bricks and tiles; and,

3. Mr. James Douglas, also, for a machine for making bricks, of the same date; but as we are not in possession of the specifications of the two last-mentioned patents, we shall content ourselves with men-

tioning another, of a later date, which appears to us exceedingly ingenious.

4. Mr. Isaac Sandford, of Hartford, in Connecticut, North America, on the 20th of January, 1800, received the King's patent for a method communicated to him by Dr. A. Kinsley, of the same place, for manufacturing bricks, tiles, and pottery-ware in general, and for discharging the moulds used therein. The principle of this invention is amply detailed in the specification, a copy of which is inserted in the 13th volume of the "*Repertory of Arts*," &c. p. 148, and following, illustrated by a plate. From the subjoined extract, however, the reader may form a tolerable idea of the nature and utility of this invention, which chiefly consists in a newly-contrived apparatus, for expediting the tedious process of making bricks, and other earthen-ware.—The moulds used in this machine may be various, either with false or fixed bottoms, sides, or ends; or open at top, bottom, sides, or ends: but such as are used by the original inventor, Dr. Apollos Kinsley, are the most convenient, and contain from one to six bricks in each mould, according to their size. Each frame, or mould, has a fixed bottom; and, when more than one brick is moulded in the same frame, or mould, the division between them is made in three parts. The middle piece is made a little tapering, and serves as a wedge to confine the other two parts in their places, while the mould is filling; and, when discharged, the wedge or middle part is lifted out, which liberates the other two: by that means the moulds are discharged with ease. Moulds for large single bricks and ornaments, have one side, bottom, or end, taken off by means of steady pins, joints, or cramps, which will confine them while filling, and may be opened in any way that will allow them to discharge. The moulds may be made of metal, or of wood and lined with metal. The foot of the spindle may stand in, and be supported by a bar, made fast to the platform, at the bottom of the tub; or it may be supported by a collar, inclosing the spindle above the semi-circular sections, and made fast to the tub; by that means the whole space under the forcers will be open, and free to form bricks and ornaments of any size or shape. The friction-rollers are placed in a frame, which may be raised or lowered by screws, according to the thickness of the bricks or ornaments; and, by means of the screws, the moulds may be liberated from any foul matter, that may obstruct their passage through the machine. Clay for bricks, ornaments, potters'-ware, and tiles, of all descriptions, may be tempered and moulded of any size, or shape, in the above-described apparatus. The clay being put into the tub, is, by the action of the sections, perfectly tempered and moulded at the same time, &c.

To conclude, we shall only add, that the reasons why the modern bricks are so very inferior to those made by the ancients; which, in their monuments, after having withstood the ravages of time for many centuries, are still in perfect preservation, appear to be principally the following: In the present expensive state of society, the price of manual labour, though far from being adequate to the pressure of the times, is so considerable, that the manufacturer is under a kind of necessity to make choice of those materials which are the cheapest and most easily procured: thus, a mixture of the most improper earths and clay is often employed in the manufacture of bricks, without reflecting that two bodies specifically different in their nature, must necessarily require different degrees of heat in the kiln, in order to produce an uniform hardness, and an intimate combination of parts. On the contrary, the ancients not only selected the very best sort of clay, but combined it with other ingredients well adapted to form the most complete cement, such as coarsely powdered charcoal and old mortar added to the clay. Of this description, likewise, were the bricks which Professor PALLAS, on his last journey through the southern provinces of Russia, discovered in the stupendous Tartar monuments, and which would scarcely yield to the force of a hammer. Another advantage peculiar to the bricks and tiles manufactured by our fore-fathers, arose from their method of burning them uniformly, after being thoroughly dried. There is no doubt, that if all the defects before pointed out, were removed, and modern brick-makers were to pay more attention to their art, by digging the clay at proper seasons, working it better than is done at present, bestowing more care on the burning of them, and particularly by making them much thinner than what is prescribed by the standard form, we might produce bricks of an equal strength and durability to those of our less enlightened, but more provident and industrious, ancestors.

BRICK-LAYERS, artisans whose business it is to build with bricks, and to perform brick-work; such as tiling, walling, chimney-work, and paving with bricks and tiles: in country places, they also undertake the masons' and plasterers' business. The London brick-layers were incorporated as a regular company in 1568, consisting of a master, two wardens, 20 assistants, and 78 of the livery.

The art of brick-laying has been analysed in a particular treatise by MOXON; in which he describes the materials, tools, and method of working used by bricklayers. Great care should be taken that bricks be laid joint on joint in the middle of the walls as seldom as may be. If they be laid in winter, let them be kept as dry as possible; if in summer, they ought to be wetted, because they will then unite with the mortar better than if they were quite dry, and render the work much stronger. In large buildings, or where it is too troublesome to dip each brick separately, water may be thrown on every course after they are laid, as was judiciously done, when building the College of Physicians in London, on the suggestion of Dr. HOOKE. If bricks are laid in summer, they should be covered, to prevent the mortar from drying too quickly; because, thus it will not be cemented so firmly as if it were left to dry more gradually. In winter also they ought to be well covered, to protect them from rain, snow, and frost, which last is the worst enemy to mortar, especially if the work has become wet just before the frost happens.

OIL OF BRICKS, a singular preparation, formerly much esteemed in the cure of many diseases; but now justly exploded as absurd and pernicious rather than useful. It is obtained by soaking fragments of bricks in olive oil, and afterwards distilling them in the usual manner. In the present improved state of chemistry, it has been found that, by this fanciful process, the oil of olives, so far from being impregnated with healing ingredients, is necessarily corrupted.

Brick-water, or water impregnated with the contents of bricks, is possessed of properties so peculiarly striking, and at the same time so pernicious in their effects, when used for culinary purposes, that we cannot, in justice to our readers, withhold from them the following curious experiment made by Dr. PERCIVAL, and stated in the first volume of his Essays. He steeped two or three pieces of common brick, four days in a bason full of distilled water, which he afterwards decanted off, and examined by various chemical tests. It was not miscible with soap; struck a lively green with syrup of violets; became slightly lactescent by the volatile alkali; but entirely milky by the fixed alkali, and by a solution of sugar of lead. No change was produced on it by an infusion of tormentil-root. Hence the Doctor justly concluded, that the *lining of wells with bricks*, a practice very common in many places, is extremely improper, as it cannot fail to render the water hard and unwholesome. Clay generally contains a variety of heterogeneous matters; and coloured loams often participate of bitumen, and the ochre of iron. Sand and lime-earth are still more common ingredients in their composition; and the experiments of Mr. GEOFFREY and Mr. POTT prove, that the earth of alum also may in considerable quantity be separated from clay. As therefore clay is exposed to the open air for a long space of time, before it is moulded into bricks and burnt, this process in many respects resembles that by which the alum stone is prepared. And it is probable, that the white efflorescence, which is frequently observable on the surface of new bricks, is of an aluminous nature: indeed the combination of the vitriolic acid with the earth of alum, may be sufficiently accounted for, partly from the long exposure of clay to the air, before it is moulded into bricks, and partly from the sulphureous exhalations of the pit-coal used for burning them, together with the suffocating, bituminous vapour arising from the ignited coal.

BRIDGE, a construction of stone, timber, or iron, consisting of an arch or arches, and built over a river, canal, &c. for the convenience of passengers. A bridge built of stone is evidently the strongest and most durable: the proper situation for it is easily known; and the only circumstance necessary to be observed is, to make it cross the stream at right angles, that boats may readily pass through the arches with the current of the river.

Those bridges built for a communication between high roads, ought to be so strong as to resist all accidents, and afford an easy passage to the waters: they should therefore be at least as long as the river is wide at the time of its greatest flood; because, by the accumulation of the waters above, too great a fall may be occasioned, and the foundation of the piers and abutments may thus be undermined.

The necessary requisites in a bridge are, that it be well designed, commodious, durable, and suitably ornamented. The piers of stone bridges should be equal in number, that the central arch may be where the current is strongest. As the piers always diminish the bed of a river, it must be hollowed in proportion to the space occupied by them, especially where frequent inundations prevail, so that the waters may gain in depth, what they lose in breadth. It has been ascertained by experience, that when the height of the piers is six feet, and the arches are circular, it is sufficient to build the former two feet more in thickness than the sixth part of the width of the latter; or in other words, the thickness of the piers of an arch of 36 feet, ought to be 8 feet; those of an arch of 48 feet, 10 feet, &c. Rectangular piers are seldom adopted, except in bridges over small rivers. In all others they project by a triangular prism, which presents an edge to the stream, in order to divide the water, and prevent the accumulation of ice, as well as to hinder vessels from running against them.

When the banks of rivers are of a tolerable height, the bridge should be made quite level above, and all the arches of an equal width; but where the banks are low, and, for the sake of navigation, a large arch is made in the middle of the stream, then the bridge ought to be more elevated in the centre than at the ends; in which case the slope should be easy and gradual on both sides, so as to form one continued curve.

The width of small bridges is generally thirty feet, but those near large towns usually have thirty feet clear carriage way, besides the footpath: the parapet walls on each side are about eighteen inches thick, and four feet high; they commonly project with a cornice underneath; sometimes ballustrades of stone or iron are placed upon the parapet, as at Westminster-bridge; but this method is only employed where a bridge of great extent is constructed near a capital.

Where stone bridges cannot be erected on account of the expence, very strong and durable bridges may be constructed of wood: these ought to be so framed, that all the parts may press upon each other like an arch; and thus, instead of being weakened by the pressure of a heavy body in its passage over it, they will become stronger. The method of forming a wooden bridge is so well known to every architect, that it is needless to enlarge upon the subject.

Among the Romans, the building and repairing of bridges was committed to the *pontifices*, or priests; and the care of these edifices was afterwards undertaken by the Emperors themselves. In the middle ages, the constructing of bridges was classed among the acts of religion, and a regular order of hospitallers was founded by Saint BENEZET, towards the end of the twelfth century, who were denominated *pontifices*, or bridge-builders; their office was to facilitate the progress of travellers, by making bridges, establishing ferries, and receiving strangers into hospitals, or houses, on the banks of rivers.

Of all the bridges of antiquity, that built by TRAJAN over the Danube is allowed to be the most magnificent: the piers were 20 in number, built of square stone, and each 150 feet above the foundation, 60 feet in breadth, and 170 feet distant from each other. The piers of this vast structure still remain. Among modern bridges, that built over the Thames at Westminster may be considered as one of the most magnificent in the world; it consists of 13 large and two small arches, together with 14 intermediate piers: the two middle piers are each 17 feet in thickness at the commencement of the arches, and contain 3000 cubic feet, or near 200 tons of solid stone: the middle arch is 76 feet wide.

Blackfriars bridge is also an exceedingly light and elegant structure; it contains nine large arches of an elliptical form; the central arch being 100 feet wide.

We cannot in justice avoid mentioning the patriotic efforts of Mr. Burdon, member for Durham, who in 1792 obtained an act for the erection of a bridge across the river Wear, near Sunderland. This structure is of cast iron, and consists of six ribs, at five feet distance from each other: the spandrils are composed of cast iron circles. The six ribs were put together over the river in the short space of ten days. The superstructure is of timber, planked over to support the carriage-road, which is composed of marl, lime-stone, and gravel, with a cement of tar and chalk upon the planks, to preserve them: the whole width of the bridge is 32 feet, and the arch is supposed to weigh upwards of 900 tons, of which 260 are iron.

This magnificent structure is erected on improved principles, yet differing from those adopted by the Colebrook-Dale Company. Although adhering to the ancient construction of bridges, by the subdivision of the parts of the arch, in the manner of key-stones, Mr. Burdon took advantage of the ductility and tenacity of iron, to produce an arch of that metal, at least fifteen times lighter than a corresponding arch of stone, and most easily put together.

The expence of constructing this bridge amounted to 26,000l. the whole of which, except 4000l. was furnished by Mr. Burdon. This gentleman, in 1795, also obtained a patent for his invention of the manner of making and applying cast iron blocks, to be substituted in lieu of key-stones, in the construction of arches, which blocks, tubes, &c. he employed in the bridge above-mentioned.

A patent was granted to Mr. Nash, of Dover-street, in 1797, for an invention somewhat similar to that above-mentioned. He provides hollow masses of cast or wrought iron, which are to be filled with earth, sand, &c. and have the appearance of solid bodies. According to this plan, the arch of the bridge is formed by hollow frames, or boxes, each consisting of four sides and a bottom. These boxes, after being properly arranged in the manner stated by the patentee, are then to be filled with sand, stones, &c. by which means the arch becomes like one solid body cased with iron. A farther explanation of this invention may be seen in the 6th volume of the *Repertory of Arts and Manufactures*.

The latest patent for bridges, was that granted in June 1800, to Mr. Samuel Wyatt, of Chelsea College, for his invention of a new method of constructing bridges, warehouses, &c. without the use of wood, as a constituent part. The principle of his discovery consists in the combination of pipes, tubes, or hollow pieces of cast iron, in a longitudinal direction, and plates or pieces of the same material, having sockets in them to receive the ends or shoulders of the pipes, placed transversely, and extending from one side of the bridge to the other, so that when the requisite number of pipes, &c. are put together, they form the arch so firmly as not to require the aid of screws, bolts, cramps, or any iron fastening whatever; but the joints should be closed with lead or cement.

When applied to warehouses and other buildings, Mr. WYATT's invention consists in forming arched cielings of cast iron, and supporting them and the floors by hollow pillars, or cylinders, of the same material. It ought to be remarked, that the number of sockets in the transverse iron plates, should always correspond with the number of ribs in the arch.

Various other kinds of bridges are constructed, according to the purposes for which they are designed, such as pendent or hanging-bridges, draw-bridges, floating-bridges, and those made of copper, or wooden-boats fastened with stakes or anchors, and covered with planks; but as the description of them would swell this article to an undue length, and as they are not immediately connected with subjects of economy, we shall content ourselves with having given the preceding account of bridges in general.

BRINE, or Pickle, is water saturated with saline particles. It is either native, as the sea-water; or factitious, when formed by a solution of salt in water.

Pickle made according to the common rule, *that it should bear an egg*, may be sufficiently strong to preserve substances intended for early use. A true pickle, however, for preserving meat, fish, and butter, during a long voyage, ought to be boiled down till the salt begins to crystallize, which is discoverable by a thin scum on the surface of the liquid while it continues over the fire. The water being then completely saturated with salt, the pickle is perfect.

In the salt-works at Upwick, in Worcestershire, a pit yields at the same time three sorts of brine, of different degrees of strength. This pit is worked by a pump, and the strongest salt first brought up from the bottom, is called *first man*; the next, which is of an inferior quality, is denominated *middle man*; and the third, or weakest, *last man*.

Leach brine is what drops from the granulated salt in drying: it is preserved and boiled a second time, being stronger than the brine of the pit. The species of sand found in the Staffordshire brines, after coction, is supposed by naturalists to be produced by that operation, as it was not previously found in the water.

Brine-pan, a place where salt-water is confined and exposed to the heat of the sun, by which salt is obtained by evaporation.

Brine-springs, those saline fountains which yield water for the manufacture of salt. It is supposed that the saline spring at Namptwich, in Cheshire, would be sufficient to yield salt for the consumption of the whole kingdom.

Besides this, there are several other remarkable brine-springs in England, particularly that of East-Chennock, in Somersetshire, which rises twenty miles from the sea; and another at Barrowdale, near Keswick, in Cumberland. The latter rises in a plain near a bog, and sixteen gallons of the water yield one of pure salt, which is the more remarkable, as an equal quantity cannot be obtained from less than twenty-two gallons of the waters of the German ocean.

There are several other salt-springs beside those above mentioned, particularly at a place in Durham, called *Salt-water Haugh*, where a multitude of saline springs rise in the river Wear, to the extent of about forty yards in length, and ten in breadth. One of these, which issues from a rock, is so strong, that in the space of a hot summer's day the surface is covered with pure crystallized salt. In these springs the water is strongest at the bottom, and richer in dry than in wet weather. They generally yield four ounces of salt from a pound of brine. It is probable that there is an immense mass of fossil salt in the bowels of the earth in the counties where these springs arise. There are several other substances dissolved in their water beside salt, particularly sulphureous matter, an impure ochre which discolours the brine, but speedily subsides; and in most, a selenitic earth is found deposited at the bottom of the salt-pans.

Brining of Corn. See SMUT.

BRISTOL HOTWELL, is situated at the bottom of St. Vincent's Rock, on the Gloucestershire bank of the river Avon, about a mile below Bristol, and within four of the Channel, or arm of the sea.

The rock, from which the hot spring issues, is a hard, compact, and very fine lime-stone, interspersed with calcareous spar, and containing those transparent quartz crystals, formerly much esteemed, and known by the name of Bristol Stones.

The Hotwell spring is a clear tepid water, which rises to the quantity of forty gallons in a minute. When fresh, it is inodorous, and sends forth numerous air bubbles if poured into a glass. It is agreeable to the palate, but without any particular taste. Its specific gravity is 1.00077; from which it is evident, that it contains but a very small intermixture of foreign substances. It is of a very moderate warmth, and the difference of temperature, as given by several observers, may be partly owing to a slight variation in the heat of the spring itself, and partly to a difference in the thermometers. Dr. CARRICK calculates its real temperature, as it is drunk at the pump, at 74½°; and Dr. NOTT states its highest point at 76°; though we have, with a very accurate thermometer, in April, 1798, found it to be only 72°.

According to Dr. CARRICK's analysis, a gallon of 231 cubic inches contains 30 inches of carbonic acid, and three inches of common air. By a farther analysis of Bristol water, by evaporation to dryness, he obtained the following contents in the wine gallon: of muriated magnesia, 7¼ grains; muriated soda, 4; sulphated soda, 11¼; selenite, 11¾; and carbonated lime, 13½; making 47¾ grains of solid contents.

Dr. NOTT, from one gallon of the water, obtained a residuum by evaporation, which weighed 52 grains. On examination, he found it to contain, in various combinations, vitriolic acid, aërial (carbonic) acid, a peculiar gas, holding calx in most intimate solution, marine salt in a large proportion, and calcareous earth.

From these investigations of the Hotwell water it is evident, that the principal component parts are, a large proportion of carbonic acid gas, or fixed air; and a certain portion of magnesia, and lime in various combinations with the muriatic, vitriolic, and carbonic acids. The general inference is, that it is considerably pure for a natural fountain, as it contains no other solid matter than is found in almost all common spring water, and in less quantity.

On account of these ingredients, especially the carbonic acid gas, the Hotwell water is efficacious in promoting salutary hemorrhages in green sickness, as well as in the blind hemorrhoids. It may be taken with advantage in obstructions and weakness of the bowels, arising from habitual costiveness. It is one of the safest and most efficacious remedies in neutralizing and sweetening the acrimony of the vitiated humours of debilitated and consumptive patients, as it is supposed to pervade the most minute capillary vessels, and is well known to have a salutary effect on the first passages. Hence it has, for upwards of a century, been justly considered as a specific in diabetes; but if, in this disease, as well as in hectic fevers in general, the water should disagree with the stomach, as is frequently the case with persons who have impaired that organ by intemperance, or if there be room for the least apprehension of plethora, or a determination of the blood towards the breast and head, the use of it should not be attempted, without proper advice.

But the high reputation which this fountain has acquired, is chiefly in the cure of pulmonary consumption. From the number of unsucceſsful cases, however, among those who have used the Bristol water in this disease, many have denied any peculiar efficacy in this spring, superior to that of common water. Experience has proved that it alleviates some of the most distressing symptoms of this formidable disease; and it is particularly efficacious in moderating the thirst, dry burning heat of the hands and feet, partial night-sweats, and hectical symptoms. Hence, in the earlier stages of phthisis, this water may materially contribute to the restoration of health, and even in the latter periods, mitigate the disease, when the cure is doubtful, if not hopeless.

The sensible effects of this water, when drunk warm and fresh from the spring, are, a gentle glow of the stomach, succeeded sometimes by a slight and transient degree of head-ach and giddiness. By a continued use, in most cases, it is diuretic, keeps the skin moist, and perspirable, and improves the appetite and health. Its effects on the bowels are variable. On the whole, a tendency to costiveness seems to be the more general consequence of a long course of this medicinal spring, and therefore the use of a mild aperient is requisite. These effects, however, are applicable only to invalids; for healthy persons, who taste the water at the fountain, seldom discover any thing in it but a degree of warmth, which distinguishes it from the common element.

The season for the Hotwell is generally from the middle of May to October; but as the medicinal properties of the water continue the same throughout the year, the summer months are preferred merely on account of the concomitant benefits of air and exercise. A gentle laxative is the only necessary preparative, previous to the use of the water, especially after a journey, by which the body is generally disposed to costiveness. Two or three days rest ought to be taken after great fatigue, before this water can be used with advantage.

Early in the morning, and two hours before breakfast, is the most proper time for employing this water medicinally, when it is usual to take two glasses, spending about half an hour in gentle exercise between each dose. Two glasses are afterwards taken between breakfast and dinner; and these are generally found to be sufficient in one day. The size of the glass varies from a quarter to half a pint: the latter is reckoned a full dose.

Hectical patients, however, should begin their dietetic course with a glass of ass's milk, and gradually increase the quantity from half a pint to a pint.

Those with whom the water disagrees, when taken fasting, should begin with a quarter of a pint at a time, and take from four to six doses in the course of the day; one dose about an hour before, and another an hour after a meal.

If it operate as a cathartic, which is not uncommon in relaxed habits, a small dose of ipecacuanha, or if it occasion costiveness, a quantity of rhubarb and cream of tartar, will be necessary to assist its operation. In every case, it is best to drink it at the fountain-head, as its volatile particles easily escape. The exercise of walking, or riding on horseback, immediately after taking the water, can be recommended to the robust only; for the infirm require more gentle exercise, such as riding in a carriage, sailing in a boat, and the like. Persons of a very irritable habit should sit down for a quarter of an hour, after having taken a draught of the water, which may be increased from a quarter of a pint to a pint, according to circumstances.

The Hotwell, though considerably higher than the river Avon, is, however, so far affected by the spring tides, which rise in that river, that it becomes, in some degree, turbid. It is then not thought to be so efficacious; but, after two hours pumping, the spring generally returns to its original purity.

British Wines.—See Wine.

BROAD-CAST, a term in husbandry, used to denote a particular mode of sowing corn, pulse, turnips, clover, grasses, and most field-plants. When seeds are scattered over the surface of the ground by the hand, they are said to be sown in broad-cast; by which, this method is distinguished from drilling, and horse-hoeing, or the new husbandry.

The comparative merit of the drill and broad-cast has, by several experiments, been determined in favour of the former. One of the most practical details on this subject, was communicated to the Society for the Encouragement of Arts, Manufactures, and Commerce, by Mr. Boote, of Atherstone, who, in the year 1789, obtained the gold medal from that patriotic institution, as an acknowledgment of his merit, in ascertaining this interesting point.

Mr. Boote selected a piece of cold clay land of twenty acres, four of which were drilled with four bushels of wheat; and, at the same time, four acres adjoining, of a similar soil, were sown in the broad-cast way, with ten bushels of the same grain.

In the beginning of April, 1788, the drilled wheat was first hoed, and again in the last week of the same month, when the broad-cast was also hoed, with hoes of a proper size for the purpose.

At harvest, the crops were separately reaped and threshed, to ascertain the difference of each produce. That of the four acres drilled was one hundred and nineteen bushels, one gallon, and four pints; and the four acres broad-cast yielded ninety-four bushels, two gallons, and four pints. Hence the difference in favour of the former, was twenty-four bushels, seven gallons, valued at five shillings and sixpence a bushel, together with six bushels of seed saved by drilling, which cost seven shillings and four-pence halfpenny a bushel, amounting in the whole to nine pounds one shilling and three farthings.

In this comparative experiment, a bushel of wheat produced by the broad-cast was nearly equal in weight to a bushel of that obtained from the drill. Mr. Greenway, however, by an experiment made in the year 1787, found that the grain of his drilled crop was superior to that of his broad-cast, not only in quantity but in quality, the former weighing two pounds per bushel more than the latter. But, as his broad-cast crop was not hoed, it may be fairly inferred, that it did not arrive at full maturity, either in consequence of the injury done to it by weeds, or for want of the soil being pulverized by the hoe.

The superiority of the drill method, in the culture of turnips, was ascertained by Mr. Dann, of Gillingham, and the silver medal of the Society adjudged to him for his successful experiment.

On the 6th of July 1789, he drilled four acres of turnips, and, on the same day, in the same field, he sowed two acres broad-cast. A very considerable difference appeared in favour of the drilled plants, from their first coming up, in consequence of which he sowed no more by broad-cast. The drilled turnips were ready for hoeing five or six days before those that were sown broad-cast on the same day. Besides drilled turnips being less liable to injury from frost, and less difficult to hoe, than those sown by broad-cast, about three-fifths of the seed used in the latter method, are sufficient for the ground when drilled. When the turnips were come to maturity, Mr. Dann selected two perches from each of those cultivated according to the different methods before-mentioned, and found that the two perches drilled, produced 494lb.; and those broad-cast only 446lb.; making a difference of 48lb. in favour of the former method.

It must be evident to the agriculturist, that seed deposited from one and a half to three inches deep in the soil, will vegetate sooner, and grow faster, than that sown on the surface, which is seldom buried deeper than from one quarter of an inch to an inch—at a season, when moisture is particularly requisite for the growth of the plant.

BROCCOLI, a species of the *Brassica*, or Cabbage-plant, cultivated for the use of the table. There are several kinds of this plant, particularly the purple, the white, and the black broccoli, &c. but the Roman, or purple species, is preferable

able to all others. The seeds of this vegetable should be sown about the latter end of May, or beginning of June, and when the young plants have germinated eight leaves, they should be transplanted into beds. By this management, towards the latter end of July they will be fit to be planted out in some well sheltered piece of ground, at the distance of a foot and a half in the rows, and two feet between each row.

The soil proper for broccoli is rather light than heavy. The brown, or black species, though inferior to the Roman, is much hardier. It should be sown in the middle of May, and planted about two feet and a half asunder. Naples broccoli has a white head similar to the cauliflower, and is scarcely distinguishable from it in flavour.

According to Dr. DARWIN, the cultivation of broccoli and cauliflower must be very similar, except as to the seasons of the year; for they are varieties of the same species. The following directions for the culture of this plant were transmitted to the Doctor by Mr. TIGHE, of Ireland; which, for their practical utility, we shall lay before our readers.

Broccoli may be so managed, as to supply the table with a delicious and salutary vegetable during seven months of the year, namely, from the beginning of November till the end of May. For this purpose, procure prime seed from Rome or Naples, both for early and late sowing. Sow at the cessation of the vernal snows, and repeat it once a month till the end of May, or longer. When three leaves appear, transplant them; and when six leaves appear, transplant them a second time. Afterwards in June, July, and August, transplant them again two or three feet asunder, and let them remain. During September and October, the ground must be loosened, repeatedly cleared from weeds and stones, and the plants earthed up, to preserve their roots from the frost, and to prevent their being injured by the equinoctial winds. Sprinkle the mould about them occasionally with water impregnated with dung. Care should be taken to sow and plant them at a distance from hedges, trees, and walls.

The head of the broccoli is generally completed in five or six days from its first appearance, and should not be suffered to remain much longer; the stalk may be boiled with the flower, but should be peeled before it is brought to the table.

Some kinds of Italian broccoli are said to produce bulbs at their roots, which are supposed to be for the purpose of supporting other stems. If such stalks appear, they should be broken off when the principal stem is transplanted.

In order to obtain good seed of the Naples broccoli, a few of the largest heads of the earliest growth must be reserved to run up to seed. All the under shoots should be taken off from time to time as they sprout, leaving only the principal stem to produce flowers and seed. By this management, if no other species of cabbage be permitted to seed near the broccoli, its seeds will be as good as those imported, and the propagation of the plant may thus be continued for many years.

BROME-GRASS, or *Bromus*, L. a genus of plants comprehending forty-six species, of which, according to Dr. WITHERING, *only nine,*

nine, but, according to Dr. SMITH, *twelve*, are indigenous: the following three are the principal:

1. The *Secalinus*, or Smooth Rye Brome-grass; the *Polymorphus* of WITHERING; which is not rare in Norfolk, and grows near Edwin's Ford, Caermarthenshire, among the winter corn; with panicle expanding, husks naked, seeds distinct, awns shorter than the blossom, not quite straight; it flowers in July. Cattle are fond of this grass, the seeds of which are prevalent among rye, in a considerable proportion, and when ground with the latter for bread, not only render it blackish, but produce a narcotic or stupifying effect.—From its flower-bundles, as BECHSTEIN informs us, a beautiful green dye may be easily extracted.

2. The *mollis*, or Soft Brome-grass, Lob-grass or Oat-grass, is mostly found growing in corn-fields, though sometimes in meadows, pastures, hedge-banks, and even on walls: panicle rather upright; leaves very soft and woolly; awn about the length of the blossom; flowers in May and June.—BECHSTEIN affirms that this plant affords a very agreeable fodder to all kinds of cattle, and that it deserves to be cultivated on sandy lands, as being well adapted to consolidate the soil. But its merits and demerits, in an agricultural view, are not sufficiently ascertained. Mr. SWAYNE says, that it is a troublesome weed in corn-fields, and therefore disliked by farmers; while it is of little value in pastures and mowing grounds, where it generally sheds its seed before the time of mowing, and produces very few root-leaves.

3. The *pinnatus* *(Festuca pinnata*, L.) or Spiked Heath Brome-grass, is found growing on heaths, and fields of a calcareous soil, particularly in Yorkshire, Oxfordshire, and Kent: its straw undivided; spikets alternate, nearly sitting; cylindrical, somewhat awned: it flowers in July.—This grass is much relished by cattle of every description, but especially by sheep and goats.

It deserves to be remarked, with respect to the different species of brome-grass, that, though they may be allowed to grow in meadows and pasture-grounds, their seeds should not be suffered to mingle with corn. To extirpate this noxious weed from rye and wheat-grounds, the farmer will find it his interest to employ (as is frequently done on the Continent) young people, or even children, in *early* weeding. Such an expedient should be particularly adopted, when the crop of a promising field of wheat is intended for seed-corn; as, by this precaution, not only the land may be cleared of the pernicious roots, but the farther propagation of this weed will be effectually prevented. Lastly, the seeds of brome-grass, when mixed with corn, render it much lighter, and consequently of less value to those who purchase and sell grain by weight.

BRONZE, a metallic compound of copper and tin, to which zinc and other substances are sometimes added. It is hard, brittle, sonorous, and specifically heavier than the metals of which it is composed.

M. TILLET, in his memoir concerning the ductility of metals, observes, that in bronze the colour of the copper is totally disguised by that of the tin, even though the proportion of the former be four-fifths to that of the latter. This compound is much more fusible than copper alone, and less liable to be covered with verdigrise.

From the properties here enumerated it appears, that bronze is well calculated for the casting of bells, cannons, statues, and other works exposed to the air and weather.

Bronze-colour, in imitation of the metal, is much used by the colourmen of Paris, who prepare two sorts of it, namely, the red bronze, and the yellow or golden: the latter is made solely of the very finest and brightest copper-dust; the former is prepared of the same material, by adding a small proportion of well pulverized red ochre. Both are applied, with varnishes, to the outside of substances, as gold leaves are in gilding. But, to prevent it from turning green, the bronzed work should, as soon as laid on, be carefully dried over a chafing-dish.

Brooding. See HATCHING.

BROOK, a little river, or small current of water. It is distinguished from a river by this circumstance, that in general it has a current only at particular seasons, whereas a river flows throughout the year.

Considerable damage is sometimes occasioned by the overflow of brooks, in consequence of sudden and heavy falls of rain. An inundation is caused by a stoppage of the water in its course, which prevents it from running off as fast as it comes in; consequently, if the channel for the efflux be larger than that for the influx, the water will not overflow the banks. Thus, by opening the channel of the river Welland, at Harborough, in Leicestershire, to a considerable distance below the bridge, the river has never since overflowed the town, as it formerly did after sudden rain.

The legislature has enforced the clearing of the channels of brooks near turnpike-roads, by enacting, that the commissioners shall give notice in writing, to the overseers of the highways, of the several parishes through which such brooks or rivers flow, to open their respective channels, that the water may have free passage.

BROOK-LIME, the *Veronica Beccabunga*, L. a species of SPEEDWELL, growing in slow, shallow streams, and near springs that seldom freeze. The whole of this perennial plant is smooth and succulent; the stem creeping; the leaves are egg-shaped, flat, serrated with glands; the blossoms, which are blue, appear in June and July.—We have mentioned it as one of the neglected vegetables, which may occasionally be used for culinary purposes, and particularly as a salad.

BROOM, the Common, or *Spartium scoparium*, L. an indigenous plant, very common on sandy pastures and heaths, and requiring no particular description. When growing of a large size, the broom deserves a place among our flowering shrubs, on account of the profusion of its gold-coloured blossoms. Its use is very extensive, not only in domestic economy, but likewise in the arts, and in medicine. Although this vegetable is chiefly employed for making brooms, thatching houses, and covering stacks in preference to straw, as it more readily admits the air into the stack, and equally well secures it from rain; yet it also serves as a substitute for the oak-bark, in the tanning of leather; for which purpose both the twigs and branches are usefully employed. The old wood of the common broom furnishes the cabinet-maker with most beautiful materials for veneering. In some places, the tender branches of this plant are mixed with hops in brewing; but we doubt whether they are wholesome, as it is affirmed that sheep become intoxicated by browsing upon them. The flower-buds may be preserved as pickles, and eaten instead of capers. From the roasted seeds, a kind of coffee has been made by the house-wife, though of inferior taste to that obtained from the roots of the carrot, beet, succory, &c.

The macerated bark of the broom has been found sufficiently fibrous and elastic, to be manufactured into cloth.—A tolerably pure alkaline salt is produced by burning the whole plant.

In proof of the medicinal properties of this vegetable, Dr. MEAD relates the case of a dropsical person, who was recovered by taking half a pint of the decoction of green broom-tops, with a spoonful of whole mustard seed, every morning and evening. The patient had been tapped three times, and had tried the usual remedies to no purpose. Dr. WITHERING, on this occasion, observes, that an infusion of the seeds, drunk freely, has been known to produce similar happy effects; but whoever expects such benefit to follow in *every* dropsical case, will be greatly deceived. He has known them succeed in one case that was truly deplorable; but out of a great number of trials fairly made, this proved to be the only instance, in which the medicine had a good effect. A strong lixivium of the ashes was used in the Swedish army, in the year 1759, for the cure of dropsies consequent to a catarrhal epidemic fever. The urine became plentiful, and the patients were soon restored.

BROOM, the Spanish, or *Spartium junceum*, L. an exotic shrub, which may be easily cultivated in our climate, by sowing it either in the spring or autumn: but as the plants will not succeed when removed after attaining a large size, they should be transplanted before they are two years old.—The twigs are employed for basket-work, and the flowers afford a plentiful supply of food for bees: hence the culture of this shrub is recommended near bee-hives.

BROOM-GRASS. See BROME-GRASS.

BROTH, a liquor in which the flesh of animals has been boiled; and which is rendered palatable by the addition of herbs, &c. If other ingredients be used, such as rice, pearl-barley, oat-meal, &c. it is then generally called *soup*.

We have already, in the article BEEF-TEA, pointed out the common error, that *broth* is more easily digested than *solid* food. And though we are countenanced in this opinion by the most enlightened physicians of the age, yet, we fear, that old customs and deep-rooted prejudices will continue to prevail, while supported by so many old women, beside those of the Faculty. Perhaps nothing but experimental conviction of the contrary, can produce a change of sentiments imbibed with the mother's milk. Mutton-broth, veal-broth, and chicken-broth, are such comfortable things, when the appetite is disordered, and the stomach fastidious, that they are generally administered in *all* states of *fever*, without any regard to the nature of the disease, or the constitution of the patient. In this preposterous manner, the stomach is inundated, and the bowels are drenched, till all their tone and vigour are irrecoverably destroyed. Indeed, from the slight degree of attention paid to the subject of *diet*, an accurate observer may be led to conclude, that the stomach is destined for a certain time to serve the purpose of a laboratory, where the effect of medicines is to be ascertained, before the vessel to be used in this chemical process has acquired sufficient vigour to withstand the attack. Yet such is the infatuation of the multitude, that they would rather encourage the prosperous commerce in emetics and purgatives, than listen to suggestions, which tend to confute spurious notions; and, by correcting their former errors, would eventually deprive them of many favourite cups and dishes. Thus, we are not vain enough to flatter ourselves with producing such a change on the prevailing manner of living, as to banish either teas or broths to their proper places—the apothecaries' shops; and to substitute in their room, more wholesome articles of nutriment; though we are firmly persuaded, from reason and daily experience, that the physical order of things has also been perverted in the present age, and that the swallowing of *drugs* is not a primary, but a *secondary*, object in the cure of diseases.

To return from this digression, which every friend of suffering humanity will readily excuse, we shall give a few directions for preparing broths from other substances, beside those made of butcher's meat.

Artificial Broth. Dr. DARWIN observes, that all the mushrooms which are cooked at our tables, as well as the ketchup made by preserving their juices in salt and water, possess an animal flavour. In proof of this, the following circumstance may be adduced, which occurred in a family of invalids, who frequently wanted *weak broth*: the sagacious cook-maid repeatedly deceived them, by administering a mixture of thin gruel with a small quantity of good ketchup, adding only a little salt, and a few shred-leaves of parsley.

Fish-broth, though nourishing, is by no means equal to that made of wholesome butcher's meat. After separating the heads of fish, gutting, and carefully cleansing them from the gall, put them into an earthen pipkin, or a tin saucepan, and cover them with water, from half an inch to one inch above their surface, accordingly as the broth is intended to be weak or strong. Onions, parsley, or celery, may be added at pleasure, and the whole should be seasoned with pepper and salt. After simmering the fish over a gentle fire, till they fall to pieces, add a proportionate lump of fresh butter well floured; when this is dissolved, and the liquor strained from the bones, the broth is ready for the table; and may be eaten with bread, either toasted or plain. The fish best adapted for making this palatable soup, are mackerel, perch, roach, dace, gudgeons, bleak, or minnows. And though we do not recommend the preparation of such liquid dishes as eligible, either in point of health or economy, yet as fish in many places, especially near the sea-coast, are of easy purchase, they may occasionally serve as good substitutes for more solid animal food, for which we have lately submitted to pay an exorbitant and unreasonable price.

Broth for horses, was formerly considered as an useful medicine for these noble animals, especially in all complaints of the bowels, or the colic. Some farriers also commended the use of broth made of *tripe*, on account of its mucilaginous quality, in fevers and other distempers, which prevent a horse from feeding. From later and more accurate observations, however, it appears that liquid *animal* food, being contrary to their nature, is pernicious to granivorous creatures; and may generate such disorders as cannot be easily remedied. The use of *broth* should therefore be confined to the administration of *clysters* when a horse is *costive*: thus, by injecting two or three quarts of a fat and emollient decoction, prepared either of tripe or other intestinal substances containing fatty matter, the crude viscidities of the bowels may be relieved. If the guts be very full, so as to require a strong stimulus, more or less common salt may be added to the clyster, without which the operation will seldom succeed.

BRUISES, or contusions, being frequently neglected at first, may produce consequences more alarming than those of wounds. Blows received on the head, pit of the stomach, hip, or the knee, are the most dangerous. A violent inflammation, in consequence of injured nerves, or the destruction of blood vessels, often occasions the mortification of those parts, which the most skilful treatment cannot retrieve, if the accident be neglected for many hours or days. Instead, therefore, of listening to officious old women, or neighbours, an experienced surgeon ought instantly to be consulted. We know a recent melancholy instance, of a most promising youth, who, when studying physic at Edinburgh, was so improvident as to suffer a slight contusion on the knee to pass unnoticed; which, however, proved fatal to him a week after the accident.

When the contusion is slight, fomentations with lukewarm vinegar and water, repeatedly applied to the part, will generally relieve it; but if it be of a more serious nature, either decoctions of the German leopard's bane (*Arnica montana*, L.) or arquebusade water (see p. 103), may be preferably used.—Dr. BUCHAN informs us, that he has often seen cataplasms of fresh cow-dung applied to violent contusions occasioned by blows, falls, bruises, &c. and never knew them fail to have a good effect. In more violent cases of this nature, the patient's diet and regimen ought to be in every respect similar to that suggested under the head of INFLAMMATION.

Bruises of dogs, which they often receive either in hunting, or by other accidents, may be cured, according to Professor BRADLEY, in the following manner: If a bruise appear externally, anoint the swelling with a decoction of chickweed and groundsel, boiled in strong ale; which will assuage the pain, and reduce the tumor: but, if it be a wound, cut away the hair, and cover it with a plaster made of equal quantities of the roots of great comfrey, melilot, and oil of roses. As the latter, however, might be too expensive an ingredient, we recommend either to substitute a little of the spirit of turpentine, or more simply, to lay two or three folds of the common black, adhesive plaster on the injured part, immediately after the accident, so as to prevent bleeding, and to exclude the air. But, if there be reason to suspect that the bruise is inward, give the dog a drench, composed of a pint of new milk, and a quarter of an ounce of spermaceti.

Bruises on the withers of a Horse, arise from pinches of the saddle, and from want of care, often imposthumate, and turn fistulous. Such tumors may be bathed three or four times a day with warm vinegar; and if this application proves ineffectual, either an ounce of the oil of vitriol, or half an ounce of white vitriol, dissolved in a little water, should be mixed with a quart of vinegar, which makes an excellent repellent lotion, and will frequently prevent the formation of an abscess. But when the swelling is attended with heat, smarting, and little watery pimples, the following mixture may be preferably applied: take two ounces of crude sal ammoniac, boiled in a quart of lime-water; or, instead of these, a handful of wood, or pearl-ashes, boiled in common water; pour off the decoction, when settled, and mix it with half a pint of spirit of wine; anoint the parts afterwards with lintseed oil, or elder ointment, to soften and smooth the skin.

In critical swellings, however, the repelling method must be avoided, and the swelling relieved by suppurating poultices. These tumors ought never to be opened before they are ripe, but suffered to break of themselves; otherwise the whole sore will be spongy, discharge a bloody ichor, and soon degenerate into an ulcer. The openings, however, may be enlarged, and the lips pared away, that the dressings may be easily applied, taking care to avoid the ligament, which runs along the neck to the withers. If a suppuration appears on the opposite side, let it be treated in the same manner. The openings should incline downward, to let the matter flow out easily. If the bones are foul, they must be dressed with tincture of myrrh, till they scale off. When the fungus is very troublesome, and the matter discharged is oily, yellow, and viscid, pledgets soaked in the following preparation will be found beneficial: take of blue vitriol, dissolved in a pint of water, half an ounce; oil of turpentine, and rectified spirit of wine, of each four ounces; white wine vinegar, six ounces; oil of vitriol, and Ægyptiacum, of each two ounces. Let this be made hot, and the pledgets soaked in it, and then immediately applied to the part affected, taking care to bathe the swelling round it with spirit of wine and vinegar. When the cavities are fistulous, the callosities must be cut out with a knife, where it can be done conveniently, and the remainder be destroyed by corrosives.

BRUSH, a domestic implement, consisting generally of a collection of hairs or bristles, fastened in a frame of wood, bone, or ivory; with, or without a handle; and used for various purposes. This simple manufacture is capable of great improvement; as we seldom meet with brushes, the hair of which is so firmly cemented, or otherwise secured in the frame, as to ensure their constant use, until the hair itself is worn out by mechanical friction. We shall, under the head of CEMENT, communicate

nicate a few hints for remedying this defect.

Flesh-brush, an instrument frequently employed for increasing the circulation of the fluids in languid habits, especially in paralytic and rheumatic cases, in order to relieve pain and uneasiness of the skin. Although we do not deprecate; but rather strongly recommend, friction to the aged and sedentary in particular, yet we are of opinion that this simple and useful operation may be performed with equal ease, and more attention to cleanliness, by a piece of flannel, than by a flesh-brush; because the perspirable matter adhering to each hair of the latter, is thus spread from one part of the body to another: whereas the former may be frequently turned, and afterwards washed, as often as is necessary.

Stomach-brush, a curious instrument which excited considerable attention about the middle of the last century. It was invented by the ancient physicians, but again brought forward by the surgeons of France and Germany, with a view to scower or cleanse the stomach, or remove foreign bodies fallen down the fauces and gullet. It consists of a piece of sponge fastened to a long whale-bone probe; or is composed of soft hair, formed into a fascicle by twisted brass or steel-wire, the handle or stem of which may be invested with silk or thread. Previous to its application, the patient drinks a small draught of warm water; then the brush, being moistened in some convenient liquor, is introduced into the gullet, and slowly protruded into the stomach, by twisting round its wire-handle. We doubt, however, whether many of our readers would submit to this painful operation, which we have mentioned here, on the authority of the *Gentleman's Magazine* for December 1750; where a *medical* correspondent farther advises the operator to draw the handle of this brush *up* and *down* in the stomach, and through the œsophagus, like the sucker in a syringe, till it be, at length, wholly extracted. He farther suggests the utility of plentiful drinking, while the brush is at work, and so long as any foul matters are discharged. Those readers who incline to try the experiment (which probably no modern surgeon would recommend, unless for removing material obstructions in the throat, &c.) will find a cut of this instrument in the work above-mentioned: and the candid author of that paper concludes with saying, that though this contrivance is greatly extolled, and said to prolong life to a great age, especially if practised once a week, fortnight, or month; yet there are *very few* instances of its happy effects; probably because it has been tried by *few.*—See GULLET and WINDPIPE.

Tooth-brush.—Many complaints prevail concerning the imperfect manner in which these instruments are manufactured. We shall not presume to offer any advice to the mechanic; having, in this respect, uniformly deprecated the use of either brushes or sponges. Regardless of vulgar prejudices, we venture to recommend the application of the small finger to the gums, when there are no interstices between the teeth; or the use of a soft piece of calico: the former is a natural instrument, not liable to hurt the gums, as it has the advantage of being soft and pliable; and, by feeling the least pressure or resistance, will have no tendency to injure the teeth or gums. Nothing, therefore, but injudicious delicacy can oppose this simple substitution.

BRUTE, a general name for all animals, except mankind. Among brutes, the monkey kind bears the nearest resemblance to the human race, both in external shape, and internal organization. Investigations relative to the structure and economy of brutes, form the subject of what is called *Comparative Anatomy*.

The essential characteristics of brutes, by which they may be distinguished from man, have attracted the attention of many philosophers. By some, a brute is defined to be an animal *not risible*, or a living creature incapable of laughter; by others a *mute animal*. The peripatetics allowed to brutes a sensitive power, but denied them a rational one. The Platonists considered them as possessed of reason and understanding; though, in a degree less pure and refined than that of man. DESCARTES maintained that brutes are mere inanimate machines, destitute not only of reason, but of all thought and perception; and that their actions are only consequences of the exquisite mechanism of their bodies. This opinion was probably adopted by DESCARTES with a view to obviate two objections ot great magnitude; one, against the immortality of the souls of brutes, if they be allowed to have any; the other, against the goodness of God, in suffering creatures which had never sinned to be subject to so many miseries. The Cartesian system is far from being conclusive, because, even admitting the arguments in its favour, to their utmost extent, it only establishes the *possibility* of brutes being inanimate, and that the power of God is *capable* of producing various actions from inanimate machines, but by no means proves that he actually has done so; besides which, it is defective, because it has no limits, as by the Cartesian method of arguing, every man might prove his neighbour to be an inanimate machine, as well as a brute.

The most rational opposers of the Cartesian system, maintain that brutes are endowed with a principle of sensation, though of an inferior nature to ours. From this subject many disputes have originated; some persons insisting that the soul in brutes is merely sensitive, and that they are entirely destitute of reason and understanding; others, that they not only possess the power of reason, but employ it to greater advantage than men do. That brutes are endowed only with sensation, and are destitute of all power of reasoning, or reflection, cannot be maintained upon good grounds, nor can it be asserted that their actions proceed entirely from instinct. It is proved by numerous instances, that education will overcome many of the natural instincts of brutes, which could never be the case, if they were absolutely incapable of reflection. On the other hand, it is certain, that no brute has ever yet been sufficiently qualified by instructions, either to understand the use of fire, or to undertake the management of that element; a circumstance that alone seems to imply a total defect of rationality.

There is a very ingenious treatise on this subject, published by the late Prof. BERGMANN, entitled "Researches designed to shew what the Brute Animals certainly are *not*, and also what they probably *are.*" He proves that they are not machines, without, however, considering them as beings whose actions are directed to *moral* ends, or as accountable creatures, subject to future rewards or punishments.

That brutes are capable of reflection and sentiment, and are susceptible of the kindly as well as the irascible passions, independently of sexual attachment and natural affection, is evident, from the various instances of regard and gratitude daily observable in different animals, particularly the dog: of these and other sentiments, such as pride and glory, many surprizing and indubitable proofs are exhibited by the ELEPHANT, of which we shall give some account in its proper place.

But, besides the qualities above alluded to, certain animals seem, on many occasions, to be inspired with a kind of presentiment, with respect to events unforeseen by the rational beings whom they concern; and various instances of this faculty may probably occur to the recollection of most of our readers.

By Divine Revelation, brutes are held out to us as objects of mercy: nothing, therefore, can be a greater reproach to human nature, than cruelty towards dumb and helpless animals. Of the different species of cruelty, none was more general in the metropolis than that of bullock-hunting; but it is to be hoped that by the late legal enactments, together with the vigilance of the magistracy, this barbarous practice will at length be entirely suppressed.

BRYONY, the WHITE, or more properly, the RED-BERRIED BRYONY, or Wild-wine; the *Bryonia alba* or *dioica*, L. is a native plant, growing in many parts of England, under hedges and thickets. The root is perennial, large, often a foot in circumference; the stem is several yards in length; the leaves nearly hand-shaped; the flowers of a yellowish green colour, appearing in May and June; and the fruit is a smooth red berry, containing five or six seeds. Some curious persons have a method of carving these roots into human figures, and selling them as mandrakes; but this useful production may be converted to much better purposes. By long steeping, and cleansing in several waters, the roots may ultimately be deprived of all their acrimony and bitterness, so as to afford a tolerable flour; from which (if credit be due to the late Rev. Dr. BÖHMER, senior of the University of Wittenberg, in Saxony), M. MORAND has prepared both *starch* and *bread.*

Although this is generally considered as one of the poisonous native vegetables, yet there is reason to believe that, especially in summer, when the bitter juice has in a great measure ascended from the root to the stalk and branches, it may usefully be converted into bread: and as it grows to a prodigious size, a little trouble would be well rewarded.—Mr. HOLLEFEAR states, that two or three of the berries have been eaten without any observable effect.

Bryony-root is purgative and acrid: its smell, when fresh, is strong and disagreeable; its taste nauseously bitter. In spring, it abounds with a thin, milky juice, which is so sharp as speedily to excoriate the skin; but a great part of the acrimony, and almost the whole of the scent, is lost by drying. In summer, the root is less juicy, and weaker both in smell and taste. An extract prepared in water, acts more mildly, and with greater safety, than the root in substance. When given in a quantity from half a dram to a dram, or half an ounce of it infused in wine, it proves a gentle purgative, and likewise operates powerfully by urine. Hence small doses of its milky juice have been strongly recommended by Bergius, for dropsical and asthmatic complaints. A cold infusion of the root, in water, is externally used in rheumatic pains, or the *sciatica*. In the form of a cataplasm, it proves a most powerful discutient. Decoctions made with one pound of the fresh root, are the best purgatives for horned cattle. In short, observes Dr. Withering, the active virtues of this plant entitle it to more attention than is bestowed on it at present.

BRYONY, the Black, or the Bryony lady-seal, the *Tamus communis*, L. is also a native of England. It has a large root, sending forth several stems, large heart-shaped, dark-green leaves; greenish flowers, and red berries. It blows from May to August, and is frequently found under hedges. According to Dr. Withering, its young shoots are good eating, when dressed like asparagus; but horses refuse to eat the plant. Its root is like that of the white bryony, acrid and stimulating.

The several exotic species of the bryony, as the *Africana*, the *racemosa*, with a red olive-shaped fruit, the *Cretica*, or spotted bryony of Crete, the *variegata*, or American bryony, merit cultivation, on account of their beautiful appearance, when full of fruit.

BUCK-BEAN, or *Menyanthes*, L. a genus of plants, comprising four species, of which two are natives:

1. The *trifoliata*, or marsh trefoil, water trefoil, marsh cleaver, or trefoil buck-bean: it grows in moist, marshy places, in many parts of Britain, and its very beautiful flowers appear in June and July. This useful plant is, according to Bechstein, a very agreeable fodder to cattle: its cultivation is therefore recommended, for improving marshy lands. Dr. Withering informs us that cows, horses, and swine refuse it. From experiments made at Upsal, in Sweden, it appears that though goats eat it, sheep will not always relish its leaves; which, by some persons, are smoked instead of tobacco. It is farther asserted by others, that such sheep as have a relish for the marsh trefoil are, by eating it, cured of the rot.

In Lapland, the powdered roots of this plant are converted into bread, which, however, is not very palatable: and the country people of West-Gothland, in Sweden, employ it for imparting a bitter to ale; for which purpose two ounces are equally efficacious as one pound of hops.

Dr. Darwin also recommends these leaves as a substitute for hops; and adds, that they might be equally wholesome and palatable. In dyeing they afford, according to Bechstein, a green and yellow colour.

An infusion of the leaves is extremely bitter, and is prescribed in rheumatisms and dropsies: one dram of them, in powder, both purges and vomits; and is occasionally given as a vermifuge. Dr. Lewis considers the *Menyanthes* as a powerful aperient and deobstruent, promoting the fluid secretions.

tions. It has of late gained great reputation in scorbutic and scrophulous disorders. Inveterate affections of the skin, have been cured by an infusion of the leaves taken at proper intervals, to the quantity of a pint in twenty-four hours, and continued for several weeks.—BOERHAAVE cured himself of the *gout*, by drinking the juice of this plant mixed with whey. Stubborn facts, like this, require great authorities.

2. The *nymphæoides*, or fringed buck-bean, or lesser yellow water-lily, growing in large ditches and slow streams. Lord LEWISHAM found it in the Thames, near Walton-bridge; and it has also been discovered in a lake, at Castle-Howard, Yorkshire. The leaves of this species are heart-shaped at the base, rounded at the end, sometimes spotted, about two inches long, and swim on the water. Its fine yellow blossoms appear in July and August.

BECHSTEIN relates, that the inhabitants of Japan, where the fringed buck-bean is also indigenous, eat it as a pickle, simply prepared with salt; or, after simmering it in water, and removing the impurities from the top, they use it in broths.

BUCK-THORN, or *Rhamnus*, L. a numerous genus of plants, consisting of 48 species, of which only two are indigenous, namely,

1. The *catharticus*, or purging buckthorn, a shrub growing in woods and hedges, very common in Shropshire. It attains, if cultivated, the height of 16 feet, flowers in May and June, and its fruit ripens about Michaelmas. Goats, sheep, and horses, eat the leaves, but cows refuse them. In our markets, the fruit of the black-berry bearing alder, and the dog-berry tree, have lately been substituted for those of the buck-thorn. But this species of fraud may be easily discovered by opening the berries; for the genuine kind have generally four seeds, those of the alder two, and those of the dog-berry only one. Besides, buck-thorn berries alone, when bruised on white paper, give it a green tint. The wood of this shrub is one of the finest for turnery, produced in this climate, as it sometimes grows to a size of six or eight inches in diameter. From the juice of the unripe berries, with alum, a yellow; and from the ripe ones, a fine green dye is obtained: the bark also strikes a yellow and brown-red colour. The juice of the unripe berries is of the colour of saffron, and is used for staining maps or paper: that of the ripe berries is the sap-green of miniature painters, and is much esteemed; but if they are gathered late in autumn, the juice is purple.

BECHSTEIN remarks, that the book-binders in Germany extract this colour by mixing the fresh juice with deep-red, or violet liquids, with which they dye the most beautiful sorts of paper and leather.

In medicine, buck-thorn berries have long been esteemed, and a syrup prepared from them is still kept in the apothecaries' shops, though seldom prescribed; as it occasions much sickness and griping. In a late Latin treatise, published by Dr. J. G. KOLB, of Erlang, 1794, the bark of the buck-thorn is much recommended as a mild, cheap, and efficacious remedy, in every respect preferable to the berries. After being exposed to the air, or soaked in water, this bark soon assumes a yellow, orange colour. It contains a considerable proportion of gummy ingredients, which render it a tonic, gently astringent, and antiseptic medicine. The resinous extract is acrid and astringent, strongly purgative and resolvent: but the bark, in powder, mixed with honey, gum arabic, or any other mucilage, as well as a watery decoction of it, operates mildly, when taken in small doses, for the cure of intermittents: it may also be beneficially employed in slow, putrid, or nervous fevers, and in general debility after chronic diseases. Externally applied, in green wounds, laxity of the fibres, malignant foul ulcers, and in stopping the progress of mortification, this remedy possesses tonic, gently stimulating and healing properties. The decoction is of great service in reducing inveterate inflammations of the eyes, and curing the itch; as it cleanses the skin, and abates the burning heat, without repelling the humours. But it should never be employed in ulcers that have arisen in consequence of erysipelas, or the rose: in other cases, its application will always be more safe, and attended with better effects, when it is at the same time used internally.

2. The *frangula*, or alder buckthorn, or black-berry bearing alder, grows in woods and moist hedges; it generally attains a height of from six to ten feet. The wood of this shrub, when young, is soft and yellow, but becomes hard and light-red with age: its external bark is dark-grey, with white spots, but internally yellow; the branches contain an orange-coloured medullary tube. Its yellowish leaves appear late in May, or June, and sometimes a second foliage comes forth in autumn. The berries are at first dark-green, then become red, and at length black, when fully ripe; containing a sweet, though unpleasant juice. Goats devour the leaves with avidity, and they are also eaten by sheep: the flowers are particularly grateful to bees. The bark dyes yellow, and with iron, black. The berries gathered before they are ripe, dye wool green. Charcoal prepared from the wood, is preferred in making gun-powder. Dambourney made the following successful experiment with the ripe berries. He bruised them in cold water, and allowed the whole to undergo the vinous fermentation, which took place in eight days. This liquor he boiled for half an hour, and then dyed wool that had been previously prepared with bismuth: thus he obtained a very beautiful green colour, which he called a new, or native green, because it was not in the least affected either by strong vinegar, or a solution of potash. On adding a little sugar of lead to the dye, the vivacity of the colour was considerably increased.

The rind, boiled in milk, is asserted to be a safe and efficacious remedy for eruptions of the skin; yet we do not advise the reader to try experiments with this, or similar remedies, without consulting a medical friend. Decoctions of the bark in table-beer, are very certain and brisk purgatives, in dropsies, or constipations of the bowels of cattle.

Buck-Thorn, the Sea, or common sallow-thorn, the *Hippophæ rhamnoides*, L. is a very important shrub, growing wild on sandy shores, in various parts of the British coast, especially in

Kent, Lincolnshire, and Yorkshire: it sometimes attains the height of eight or ten feet. Its bark is light-brown, the wood white, the small leaves of a sea-green colour, but silvery white below. The leaves appear early in spring; the yellow flowers in June or July; the fine red berries late in autumn.

In situations contiguous to the sea-shore, or the banks of rivulets, this shrub eminently deserves to be cultivated, as it is well calculated to bind a sandy soil, and to prevent the water from penetrating through banks and fences. It may be raised from seeds, but more expeditiously by planting layers, or propagating it from the very abundant spreading roots. On account of its thorny points, it affords excellent hedges, even on a sandy soil.

Although cows refuse the leaves of the sea buck-thorn, yet they are browsed upon by goats, sheep, and horses. The berries are strongly acid, with an austere vinous flavour: in Lapland, they are pickled and used as spice, but the fishermen of the Gulph of Bothnia prepare from them a rob, which, added to fresh fish, imparts a very grateful flavour.

From the leaves of this shrub, M. Suckow obtained an agreeable *dark-brown* dye for wool and silk, first treated with vitriol of iron: Dambourney succeeded in producing a similar colour on cloth that had been previously steeped in a solution of bismuth.

BUCK-WHEAT, the *Polygonum fagopyrum*, L. a species of the *Persicaria*, also called snake-weed, bucke, branks, French wheat, or crap. As this useful plant requires no botanical description, we shall proceed to state its most approved method of culture, and important uses in agriculture: both subjects being intimately connected.

Buck-wheat was introduced into Europe nearly four centuries since; and, according to Gerard's Herbal, cultivated in England, about the year 1597.—It is a native of the northern parts of Asia. During the last thirty years it has excited the attention of able agriculturists, who have furnished us with the following result of their experience. This grain delights in a mellow, dry, loose, sandy soil, but does not thrive so well in a free loamy stone-brash, and should never be sown in wet, poachy ground. It requires little or no manure, but frequent sun-shine. On heaths newly ploughed up, the turf of which has been burnt, or that have been manured with wood-ashes, its vegetation is luxuriant. The proper season for sowing is the last week in May, or the beginning of June; and though it may be sown much earlier or later, yet, in the former case it is exposed to the night-frosts of April and May, or, in the latter, it may be too late for arriving at maturity. In the year 1787, however, a crop of buck-wheat was obtained, that had been sown so late as the 22d of July. A shower of rain, after the seed is harrowed in, greatly promotes its growth, and it generally appears above ground in five or six days.

Buck-wheat is in flower throughout the summer, and would yield much larger crops, if all the grains would uniformly ripen, and could be collected at the same time. From one to three bushels are sown on each acre, in this country; and the Germans calculate sixty pounds weight to every hundred square rods of land. Three months only are required for bringing it to maturity, and it produces from twelve to twenty-fold. The most economical manner of harvesting this grain is, by pulling it out of the ground, like flax, stripping it of the seeds by the hand, and collecting them into aprons. Thus all the ripe seeds are easily separated, before they are put into bags, to be conveyed to the granary; while the straw is left, till dry, in the field. In this state, it affords an excellent substitute for hay; and it is affirmed, that the German farmer obtains, at less expence than by mowing and drying the whole, in the usual way, ten times the quantity of corn.

Another variety of this grain was, about a century ago, introduced into Germany, and has lately also been cultivated in Britain, known by the name of *Siberian Buck-wheat.* It possesses considerable advantages over the former; because it is not only a fourth part heavier in the grain, but also more palatable, and, in this respect, resembles rice. It thrives in the poorest soil, is not affected by cold, and, being more disposed to branch out, and spread its stalks, requires scarcely one half of the seed necessary for the culture of the preceding species.

From repeated experiments, made in this country, it appears that the culture of buck-wheat ought, in many cases, to be adopted in preference to a summer-fallowing; as the crop produced is not only so much clear gain, but also affords a considerable quantity of straw, for fodder and manure; beside which, it is a more advantageous preparation for the next crop. There will be sufficient time to sow the land with buck-wheat after spring feedings, a crop of turnip-rooted cabbage, or vetches. When sown in July, buck-wheat is an excellent *sheltering crop to clover*; and two crops of this grain have, in favourable years, been obtained from the same land. Mr. ARTHUR YOUNG, in the sixth volume of the "*Annals of Agriculture*," has inserted an instructive paper, communicated by the Rev. R. MOSELEY (Sept. 11th, 1786), from which we learn the following valuable facts: That three crops were sown on the same ground, between autumn and autumn, with only three ploughings, namely, winter-tares in September, with one ploughing, which were reaped early in the succeeding summer; then immediately buck-wheat was sown, after one ploughing and harrowing: in September the buck-wheat was ploughed in, and wheat was sown on this *one ploughing*, the crop of which was great. Thus, says Mr. YOUNG, as the spring advances, and the sun becomes powerful enough to exhale the humidity of the land, the crop also advances, and screens it from the action of his beams. The weeds in the soil vegetating with the young tares, are either strangled by their luxuriance, or cut off with them, before they produce seed. This crop is cleared from the land so early, that the soil would remain exposed to the sun for three months, in the most scorching heat of the summer; and, if thus left exposed, the three ploughings would be hurtful to the soil, except that they might destroy some weeds. Hence, to give one ploughing *immediately*, and harrow in buck-wheat, saves expence; and the growing herbage shades the earth, when it most requires to be protected: by this management, a dressing of manure is gained at the cheapest possible rate. In short, to introduce a system more *complete,* is not in the power of science.

It appears to be undecided, whether buck-wheat improves or impoverishes the soil. There can be no doubt that it will produce the latter effect, like all plants that are suffered to run to seed; and, on the contrary, that it renders the soil more fertile, when ploughed in, before the seeds are formed. Such, at least, is the opinion of Mr. BORDLEY, a respectable American farmer, and Mr. FARRER, a considerable corn-factor in London. But Mr. YOUNG, whose knowledge and reputation are equally great, observes, on the strength of his own experience, that this plant *ameliorates the soil* insomuch, that the farmer may have *any crop* after it, especially *wheat*; for which reason it is (1784) commonly cultivated about Norwich.

One of the principal uses of buck-wheat in this country, is that of feeding horses. Mr. FARRER advises it to be mixed with bran, chaff, or grains, either whole or broken in a mill. When consumed in the state of grass, it flushes cows with milk; hence it is presumed, that the meal mixed with grains would have the same good effect, and enrich the milk. One bushel of it is equal to two bushels of oats, even mixed with beans, and four times the quantity of bran; it will be full food for a horse a-week, and require much less hay. According to his experience, eight bushels of *buck-wheat meal* will go as far as twelve bushels of barley meal. But the American farmers assert, that it is an improper food for horses on a journey, or employed in active labour; though its meal, when mixed with other corn, or cut straw, answers well even for horses in a slow draught. It is unquestionably a *cheap corn,* subservient to many good purposes, and peculiarly excellent for fattening hogs and poultry: the former are said to become intoxicated by eating the whole plant; but no such effect takes place from the seeds alone. Dr. WITHERING observes, that sheep feeding upon this vegetable, become unhealthy; but it is relished by cows and goats.

For culinary purposes, also, the grain of the buck-wheat is used in various forms, and affords a nutritious meal, which is not apt to turn sour on the stomach. Mixed with barley, it is, in Tuscany, baked into bread, which possesses the property of retaining its moisture much longer than that of pure wheat; and though of a darker colour, it is equally nourishing. In Germany, a very palatable grit, or a granulated meal, serving as an ingredient in pottage, puddings, &c. is prepared of buck-wheat; and if the seed be pure, the produce of each bushel is ten pecks. In the electorate of Brandenburgh, not only ale and beer is brewed from a mixture of it with malt, but likewise a very excellent spirit of a blueish shade is obtained by distillation; the flavour of which resembles that of French brandy. The taste and colour of stale beer, may be much improved by adding a small quantity of the flour of this grain.

From this, as well as the preceding species of buck-wheat, the Tartars prepare a delicious food, by simply blanching the seeds, without mills or ovens, in a manner very ingenious, and applicable to most other species of grain. They first pour cold water on the seed, and stir it well, in order to bring the light and imperfect grains to the top, which are thrown away with the water. Then the wet corn is put in sacks, where it is suffered to remain from ten to twelve hours: thus, after swelling a little, it is roasted over a slow fire in iron pans, and continually stirred till the grain becomes tolerably hard, so that it feels tough and elastic between the teeth. In this manner, the husks soon crack, and may easily be separated from the kernel, in one of the plainest domestic implements, a wooden mortar, or a bruising machine made of the hollow trunk of a tree. By this process, the grain acquires a yellow transparent appearance, and is much improved in taste.

From the fresh blossoms of these plants, DAMBOURNEY dyed wool, prepared with bismuth and tin, of a beautiful brown colour; and, from the dryed flower-bundles, different shades of green. Those of the Siberian species, in particular, yielded a fine yellow, which, on boiling the wool still longer in the dye, changed into a golden tint, and at length assumed a brilliant yellow.

There is a third species of buck-wheat, the culture of which has lately been strongly recommended by Professor PALLAS, and Dr. WITHERING; and which we shall presently describe.

BUCK-WHEAT, the Climbing, black bindweed, or climbing snake-weed; the *Polygonum convolvulus*, L. a native vegetable, growing about corn-fields, gardens, and hedges; it flowers in June and July. Its seeds are as good as those of the two preceding species, are produced in greater quantity, may be more easily collected, as they ripen more uniformly, and the plants bear cold better than the exotics before mentioned. According to LINNÆUS, cows and goats eat it, but sheep, swine, and horses, refuse it.

Its culture in fields is, however, attended with this inconvenience, that its creeping stalks must be supported by brush-wood, and it is consequently better adapted for being cultivated in gardens.

It is remarkable, that most British and foreign writers indiscriminately recommend the culture of the buck-wheat, likewise, on account of its flowers, which are very grateful, and beneficial to bees; and that Dr. DARWIN, in particular (see page 230 of this Encyclopædia), mentions a species of buck-wheat, the *Polygonum melampyrum*, of which we can find no account in the botanical works of this country: with deference to his profound knowledge of natural history, we are almost inclined to think, the Doctor alludes to a very different species of buck-wheat (perhaps cow-wheat) that is not cultivated in Britain.

BUCKING, one of the operations performed in the whitening of linen cloth, or yarn.—See BLEACHING.

BUCKRAM, is coarse linen cloth, stiffened with glue, and used in the making of garments, to keep them in proper form. It also serves for wrappers to cover cloths, serges, and other articles of merchandize, in order to preserve them from being soiled, and prevent their colours from fading. In general, old sheets and pieces of cloth are converted into buckram; but sometimes new pieces of linen cloth are used for that purpose.

Buckrams are sold wholesale by the dozen of remnants, or small pieces, of about four ells long, and of different breadths.

BUD, in botany, the embryo or rudiment of a plant, growing on the stems and branches of trees, and covered with scales, or with a resinous varnish, to protect it from the winter cold, and from the depredation of insects.—Buds proceed from the extremities of the young shoots, and along the branches, sometimes single, sometimes two by two, either opposite or alternate, and sometimes collected in greater numbers. In general, we may distinguish three kinds of buds: the leaf-bud, the flower-bud, and that containing both in one covering. The first species contains the rudiments of several leaves, which are variously folded over each other, and surrounded by scales. The second species, or flower-bud, contains the rudiments of one or several flowers, folded and covered in a similar manner. This bud is called by PLINY *oculus gemmæ*, or the eye of the bud, and is employed in that species of grafting, called *inoculation*. The third sort, which is the most common of any, produces both flowers and leaves. Buds, together with bulbs, which are a species of buds, generally seated on, or near the root, are very properly called by LINNÆUS *hybernacula*, a term signifying the winter-quarters of the embryon shoot.

As plants are supposed to bear a striking analogy to animals, they may, not improperly, be reckoned both viviparous and oviparous; in which view, seeds may be considered as vegetable eggs; buds, as living fœtus's, or infant plants, which renew the species as certainly as the seed.

As each bud contains in itself the rudiments of a plant, and would, if separated from its parent vegetable, become in all respects similar to it, LINNÆUS, to shew the wonderful fertility of Nature, has made a calculation, from which it appears, that in a trunk scarce exceeding a span in breadth, no less than ten thousand buds may be produced. How great then must be the number of plants, which are capable of being raised from one large tree!—See the article LEAVES.

Flower-buds of many trees, says Dr. DARWIN, arise immediately from the terminating shoots or spurs of the preceding year, and are either accompanied with leaf buds or separately, as in apple and pear-trees. Others proceed from the shoots of the present year, alternately with leaf-buds, as those of vines, and form the third or fourth buds of the new shoots. They differ from leaf-buds, because they perish when their seeds are ripe, without producing any addition to the tree; the leaf-buds, on the contrary, decay in autumn, and their caudexes are then gradually converted into alburnum, or sap-wood; over which the new leaf-buds shoot forth their caudexes and radicles, or insert them into it, and gradually fabricate the new bark and root fibres.

Some of the disciples of LINNÆUS are of opinion, that about Midsummer leaf-buds may be changed into flower-buds, or flower-buds into leaf-buds; and this may be effected even after the vegetable embryons are generated, by weakening or strengthening the growth of the last year's buds. Hence, if some inches of a branch be lopped off at Midsummer, which is sometimes done by unskilful gardeners, the remaining buds on that branch will become more vigorous, and produce leaf-buds instead of flower-buds. But the contrary effect will take place, if a vigorous branch of a wall-tree be bent beneath the horizon, so as to impede the generation of new caudexes.

Budding. See ENGRAFTING.

BUG, in zoology, a species of *cimex*, too well known to need any description. Of the various recipes for the extirpation and prevention of these vermin, the following have been found, by experience, to be the most effectual:

1. Take of the highest rectified spirit of wine, half a pint; newly distilled oil, or spirit of turpentine, half a pint: mix them together, and crumble into it half an ounce of camphor, which will dissolve in a few minutes: shake the whole well together, and with a piece of sponge, or a brush dipped into it, anoint the bed, or furniture, in which those vermin harbour and breed; and it will infallibly kill and destroy both them and their nits. Should any bug, or bugs, happen to appear after once using it, the application must be repeated, and at the same time some of the mixture poured into the joints and holes of the bedstead and head-board. Beds that have much wood-work, require to be first taken down, before they can be thoroughly cleared of these vermin; but others may be perfectly cured without that trouble.—It is advisable to perform this work in the day-time, lest the spirit contained in the mixture take fire from the candle, while using it, and occasion serious damage:

2. Or, Take an ounce of quicksilver, and the whites of six or eight eggs; beat them together till the quicksilver appears like a black sediment at the bottom of the bason; then rub it over all the joints and crevices of the bed with a painter's brush. This will have the desired effect, while it gives a varnish to the furniture, and imparts no disagreeable smell.

3. Or, mix the pulp of the bitter apple with a solution of vitriol, and apply the composition carefully to all the crevices, which serve as a nursery to the bugs. The solution alone has proved effectual: but, if applied to stone walls, it may be mixed with lime, which will give it a lively yellow colour, and ensure success.—The boiling any kind of wooden work in an iron caldron, with a solution of vitriol, effectually prevents it from taking the worm, and preserves it from rottenness and decay.

4. Professor KALM mentions, that from repeated trials he has been convinced that sulphur, if properly applied, will entirely destroy bugs and their eggs, in beds or walls, even though they were ten times more numerous than the inhabitants of an ant-hill. And Dr. FORSTER, his translator, adds that a still more effectual remedy is, to wash the infected furniture with a solution of arsenic.

5. The cheapest, and most pleasant remedy, has lately been discovered by J. G. L. BLUMHOF, of Gottingen; who asserts in the Economical Journal (in German), for June 1797, that the green leaves and twigs of the BIRD'S-CHERRY, or *Prunus Padus*, L. if placed in the crevices and holes of places frequented by *bugs*, *mice*, and *rats*, will effectually expel them.

BUGLE, or *Ajuga*, L. a genus

of plants, comprising three species, all of which are natives; but we shall only mention the *reptans*, or common bugle, which grows in woods and moist pastures, in many parts of Britain. It has creeping suckers, and bears blue, red, and white blossoms in May. Its roots are astringent, and strike a black colour with vitriol of iron.

BUILDING is the art of constructing and raising an edifice: in which sense it comprehends as well the expences, as the invention and execution of the design.

In the practice of this useful art, there are five particulars to be principally attended to: 1. Situation; 2. Contrivance, or design; 3. Strength and solidity; 4. Convenience and utiliy; and 5. Elegance. As our aim is not to impart elementary instructions in the art of building, we shall only sketch the most essential rules, by an attention to which, the reader may be enabled to discriminate between good and bad building, and to guard against many common errors.

In laying the foundation of a building, proper care should be taken to ascertain the nature of the soil, either by a crow or rammer; or, which is still better, with a miner's or well-digger's borer, in order to discover whether it is thoroughly sound, and fit to bear the weight that is to be laid upon it. If the foundation be not very loose, it may be improved by ramming in large stones.

With regard to *situation*, a dwelling-house ought never to be erected near marshes, fens, or a boggy soil, nor too close on the banks of a river, unless it stand on rising ground, at the north or west side of the bank.—See COUNTRY HOUSE and FARM HOUSE.

Contrivance, or *design*, is of the first importance in building, as a skilful architect will not only make the structure handsome and convenient, but often save great expences; which cannot be avoided when, by hasty and injudicious management, any future alterations become necessary. A model is the most certain way to prevent mistakes, and is superior to the best draughts. But, if the latter be adopted, they should be of the largest size, so that the delineation of all the chimneys, hearths, bed-places, stairs, and the latitude of all doors and windows, in each floor, may be distinctly represented: and if the workmanship be agreed upon by the bulk, it will be useful (for obviating differences and disputes) to insert the length and thickness of the ground plates, breast-summers, girders, trimmers, joists, raisings, and wall-plates; as also the thickness of the walls, partitions, &c. In timber buildings, the several sizes of the ground-plates, interduces, breast-summers, beams, principal port-braces, quarters, window-posts, door-posts, cellar-beams, principal rafters, &c. should also be minutely ascertained.

Instead of expatiating, in this place, on the strength, utility, and elegance of buildings, it may not be improper to give an abstract of the principal acts of parliament, passed on this important subject; and afterwards compare the ancient method of building with modern improvements.—On re-building the city of London, after the great fire, in 1666, it was enacted, That in every foundation within the ground, one brick be added to the thickness of the wall next above the foundation; that no timber be laid within the funnel of any chimney; and that the proper size of timber for ordinary buildings be adapted to certain proportions specified in the act.

For the regulation of building within the Bills of Mortality, and in other specified places, it was enacted in the eleventh year of GEORGE I. and the fourth of his present MAJESTY, that *party-walls* must be erected of brick or stone; which shall be two bricks and a half thick in the cellar, two bricks thick upward to the garret-floor, &c. Besides, there were several other limitations made respecting the size and disposition of the timber. Every building is to be surveyed, and the person who offends against the statute, in any of the particulars recited, is liable to a penalty of 250l.

During the 18th century, and particularly within the last forty years, great improvements have been made in the art of building; as our modern edifices are more convenient, and elegant, than those of former times. Our ancestors generally inhabited houses with a blind stair-case, low ceilings, and dark windows; the rooms were built at random, without contrivance or symmetry, and often with steps leading from one to the other; so that we might be induced to imagine, they purposely guarded against the influence of light and fresh air. The more happy genius of our age is for light stair-cases, fine sash windows, and lofty apartments. Thus, a house built according to the prevailing taste, excels both in point of compactness and uniformity; insomuch that on the same extent of ground, it affords nearly double the conveniences that could be procured on the old plan. The modern rage for building, however, is apparently attended with this unfavourable effect, that little attention is paid to the quality of the materials, and the strength of the edifice, if speculative monied men attain their object, in erecting houses that may be lett at a certain rent. We believe there are few, perhaps no, instances recorded in ancient history, that *dwelling-houses* have tumbled down before they were finished or inhabited; such events, however, have occasionally happened, during the last twelve years, especially in the metropolis. Instead of that variegated tinsel ornament betowed on almost every chimney-piece, and other immaterial parts of a mansion, it would be more judicious, and economical, to attend to the quality and durability of bricks, mortar, and timber. Nor do our modern builders, in the erection of their walls, observe that *uniformity*, which rendered the buildings of the *Romans* almost indestructible. From the description given in the 493d number of the *Philosophical Transactions*, by Mr. ARDERON, it appears that the ruins of two old towers, belonging to the Roman camp at Castor, in Norfolk, were built in the following ingenious manner: They began first with a layer of bricks, laid flat as in pavements; on that they placed a layer of clay and marl mixed together, and of the same thickness with the bricks; then a layer of bricks, afterwards of clay and marl, then of bricks again; making in the whole three layers of bricks, and two of clay. Over this were placed bricks and lime twenty-nine inches, the outside being faced with bricks cut in squares; then brick and clay alternately, as high as the old ruins now remain standing. He adds some remarks on the hardness of the mortar, and durableness of the bricks, the length of which last is found to be 17,4-tenths inches, or a *Roman* foot and a half; their breadth 11,6-tenths inches, or precisely a *Roman* foot; and their thickness only 1,3-tenths of an inch. This last circumstance deserves particular notice, and we therefore refer the reader to the article BRICK, p. 352.

Many compositions have, with more or less success, been devised for making mortar impenetrable to moisture. The following we believe is one of the most simple and effectual: Mix thoroughly one-fourth of fresh unslacked lime with three-fourths of sand; and let *five* labourers make mortar of these ingredients, by pouring on water, with trowels, to supply *one* mason, who must, when the materials are sufficiently mixed, apply it *instantly* as cement or plaster, and it will become hard as stone. This recipe is given by Mr. R. DOSSIE, in his second volume of "*Memoirs of Agriculture and other Economical Arts*," 1771. The author, on this occasion, observes that the lime used should be *stone-lime*; that previous to its use, it should be preserved from the access of air or wet, and the plaster screened for some time from the sun and wind. He justly remarks, that its excellence arises from the particular attraction between lime and sand, which would be destroyed by slacking the lime. *Skimmed milk* (says he) is preferable to water; and for the similarity of this mortar to that of the ancients, he refers us to PLINY, VITRUVIUS, &c.

Another very durable and cheap cement in building, which is particularly designed as a handsome *coping of walls*, is that of the late P. WYCH, Esq. Take four or five bushels of such plaster as is commonly burnt for floors about Nottingham (or, according to Mr. DOSSIE, a similar quantity of any *tarras*, *plaster*, or *calcined gypsum)*; beat it to fine powder, then sift and put it into a trough, and mix with it one bushel of pure coal ashes, well calcined. Pour on the water, till the whole becomes good mortar. Lay this in wooden frames of twelve feet in length on the walls, well smoothed with common mortar and dry, the thickness of two inches at each side, and three inches in the middle. When the frame is moved to proceed with the work, leave an interval of two inches for this coping to extend itself, so as to meet the last frame-work.

In December 1780, Dr. R. WILLIAMS obtained the King's patent for his invention of a *mortar* or *stucco* for the purpose of buildings. As the term of the exclusive privilege of using this composition is now expired, we shall give the following particulars: Take of sharp, rough, large-grained sand, sifted, washed, dried, and freed from all impurities; of well-burnt lime, slaked, and finely sifted; of curd, or cheese, produced from milk; (the first, fresh made and strongly pressed, to divest it of its whey; the second, whilst perfectly sound, rasped into powder with a grater, or brought into a very light substance with scrapers, or fine-toothed plane irons, in a turner's lathe); and lastly, of water in its natural state, in the following proportions, viz. of the cheese, or curd, four pounds; the lime twelve pounds; the sand eighty-four pounds; the water ten pounds. If the sand is not thoroughly dried, or the lime has got damp from the air, the quantity of water must be less than the above proportion; and, on the contrary, when the lime is used as soon as slaked, it may require more; so that the proper stiffness of the mortar, under those circumstances, will regulate the making of the composition.

As the goodness of this mortar depends on the preservation of the natural properties of the cheese, or curd, made use of, all those parts the least tainted or rotten must be rejected; and as the cheese, like the curd produced from skim-milk, is divested of its buttery and oily particles, and on that account possesses a powerful cohesive quality, which makes it better for this work than that made of milk in its rich and pure state; it is at all times to be bought of the wholesale cheesemongers at a lower price than any other; and being more convenient than the curd, as that will require frequent making, is to be preferred to it, as well as to every other sort of cheese; for less of it is sufficient, only four pounds being allowed to the net hundred weight of all the solid ingredients; more than which might make the mortar too lively to keep in its place without bagging, but less should not be used; as that, on the other hand, would endanger its drying loose and gritty within its surface, hinder it from adhering properly to the walls, and thus reduce it to the level of common mortar. Many tedious and trivial rules are stated by the patentee, relative to the manner of applying this cement, and its preservation in boxes for ready use. Those who wish to acquire additional information concerning this subject, may find the specification of the patent, at full length, in the third volume of the "*Repertory of Arts and Manufactures.*"

In July, 1796, Mr. H. WALKER, of Thurmaston, Leicestershire, procured a patent for his invention of a method, by which houses and other buildings, of any description or dimensions, might be erected in one entire mass or body, at a much easier expence, especially in the articles of timber, lime, and workmanship, and which would be equally as durable in themselves, and less liable to accidents by fire, than buildings erected upon the common construction. His process is as follows:

1. The patentee takes an argillaceous earth or natural clay, which he purifies by the usual well-known methods, and compounds it with sand, or broken or pounded pottery or brick, coal-ashes, charcoal, or, in short, with any other of those substances which are adapted to form a good, firm, and durable brick, when properly baked; and he varies the composition according to the nature of the component parts themselves, and the purposes which they are intended to answer; but, for common constructions, he uses the same proportions as brickmakers in general. He then proceeds to mix, knead, and incorporate the said materials, till they are brought to the requisite firmness and tenacity for building; which is nearly such, that the parts of any lump or mass of the same may be readily incorporated with, or joined to, any other similar mass, by moderate blows with a wooden mallet,

and the occasional addition of a very small portion of water: this composition he calls the prepared material.

2. He constructs floors, walls, and all other buildings, according to this invention, in such a manner that the power of fire, from wood, coal, charcoal, coak, or other combustible matters, may be applied to the external and interior surfaces of the floors, walls, and other parts, by means of fires maintained in cavities left within, which he calls by the name of furnaces.

3. With respect to the particular forms, dimensions, and relative positions of the said floors, walls, and other parts of buildings, and the furnaces left or formed within the same, together with the apertures or communications, for the purposes of ventilating the fires, of suffering the volatile matters to escape, and of converting the whole into one entire mass of brick, by a due communication and continuance of heat, Mr. Walker says, the ground must be rendered solid, and the foundation laid in the usual manner; after which he applies a quantity of the prepared material before alluded to, and beats, rams, or presses it down to the thickness of about six inches; and in width, corresponding with the intended dimensions of the wall, regulated by boards or framing. He then plants upright, at the distance of about thirty inches asunder, in the said layer or bed of prepared material, a number of cylindrical pieces of wood, of about nine inches in diameter each, and eighteen or more inches in length, to serve as moulds for the cavities of the furnaces; and between each of such moulds he places, in the longitudinal direction of the wall, a number of pipes, of wood, or other materials, or rods, of combustible or incombustible matter, for the purpose of forming communications between all the several furnaces, or as many of them as he thinks proper. Then he proceeds to form another layer or bed of the material, to the same height, namely, about six inches, and disposes a number of such pipes, or rods, for the purpose of forming similar communications. In this manner, he constructs the whole, or so much of the wall as he apprehends, at the time, may be conveniently formed, in the raw or unburnt state; taking care, as the work advances, to raise the wooden cylinders, or moulds, that a sufficient portion of them may remain above the surface of the work, to admit of the reception and proper fashioning of each subsequent layer; or he forms the communications between the furnaces, by perforating the wooden moulds, in various places, at right angles to their respective axes; and through the said perforations he passes a bar of iron, or other material, which serves to connect three or more of the said furnace-moulds, and, being afterwards withdrawn, as the work proceeds, leaves cavities of communication, similar to those formed by pipes, rods, &c. in the manner before described. Farther, he opens such a number of horizontal or oblique apertures, or flues, into all the furnaces, and likewise into all the cavities, as may be requisite for admitting, on all sides, the access of atmospheric air. In some instances, he forms the horizontal or oblique apertures, or flues, by disposing, along with the pipes, a suitable number of taper rods, which are afterwards extracted.

4. When the wall is built, he either suffers it spontaneously to

dry, or promotes this effect by moderate fires in the furnaces. Sometimes by increasing the heat within, and at others, by suitable applications of fire externally, he converts the whole into one entire mass of bricks. By occasional closing or opening of the furnaces at top, or any of the other apertures, in various parts, the intelligent operator will easily understand how to regulate the progress, communication, and effect of the heat, that the conversion into brick may be uniform through the entire mass.

5. The dimensions of the furnaces, the positions and relative distances of the pipes of communication and lateral apertures, and the thickness of the layers of the prepared material, are each susceptible of great variations, according to the nature of this preparation, the activity of the fuel, the proposed solidity or figure of the work, &c.

6. He then forms the remaining parts of the wall, or edifice, by applying additional portions of the prepared material in contact with that already baked; while he also avails himself of proper and suitable external and internal moulds, supports, frames, and other occasional contrivances, well known to builders, for sustaining works, or forming arches, or determining the figure and positions of soft plastic substances.

7. The ground-floor is likewise formed of the prepared material, leaving hollow spaces between the supports beneath, for making fires, ventilated by side apertures, which are provided with numerous holes. When the floor is of considerable thickness, it will require the construction of furnaces, in every respect similar to those before described.

8. The first above the ground floor is made upon suitable temporary framing, in such a manner that the upper surface shall be plane, and the lower concave, so that it may, when baked, support itself, upon the principle of a low arch.

9, and 10. The patentee constructs, bakes, or burns other floors above the first, and also the roof, &c. he closes the apertures, fills up the furnaces, amends the deficiencies, adorns the walls, floors, ceilings, or other parts, with his prepared material, according to the taste and direction of the proprietor.

Various plans have lately been devised for securing buildings, and ships, against fire. We shall, however, mention only that of DAVID HARTLEY, Esq. who, in April, 1773, obtained a patent for his invention of applying plates of metal and wire, varnished or unvarnished, to the several parts of buildings of ships, so as to prevent the access of fire, and the current of air; securing the several joints by doubling in, over-lapping, soldering, rivetting, or in any other manner closing them up; nailing, screwing, sewing, or otherwise fastening, the said plates of metal in, to, and about, the several parts of buildings, and ships, as the case may require.—Convinced that this method would be too expensive for common buildings, and that it does not afford *sufficient* security against violent flames, when the contiguous buildings are actually burning, we shall suggest other, and more effectual means of protection, under the article FIRE.

BULB, in botany, a kind of large *subterraneous bud*, though sometimes appearing above ground, upon or near the root of certain herbaceous plants, which are therefore denominated *bulbous*. LINNÆUS considers the bulb as the winter-quarters of the future vegetable; because every bulb contains, in miniature or embryo, a plant, in all respects similar to its parent; so that many plants and trees may be propagated, with equal facility, by the bulbs or buds, as well as by the seeds.

The tender rudiments of the future vegetable, of which the bulb or bud is composed, are inclosed, and, during the severities of winter, defended against cold, and other external injuries, by a hard bark, or rind, which generally consists of a number of scales, placed over each other, like tiles, and fastened together by means of a tenacious, resinous, and frequently odoriferous substance. Thus defended, the buds remain upon different parts of the mother plant, till the ensuing spring.

Bulbs are distinguished from *buds*, by this circumstance, that the former are generated on the broad caudex of the plant within the ground, or in contact with it, and immediately shoot down their roots into the earth; whereas, buds are formed above the soil, on the long caudexes which constitute the filaments of the bark of trees, and shoot down new roots from the lower end of those elongated trunks.

Dr. DARWIN observes, that bulbs may be divided into leaf and flower-bulbs. When a tulip seed is sown, it produces a small plant the first summer, which in the autumn dies, and leaves in its place one or more bulbs. These are *leaf-bulbs*, which, in the ensuing spring, rise into stronger plants than those of the first year, but no flowers are yet generated: in the autumn, these perish like the former, and leave, in their places, other leaf-bulbs, stronger, or more perfect, than their preceding parents. This succession continues for four or five years, till at length the bulb acquires a greater perfection or maturity, necessary for seminal generation, and produces in its place a large flower-bulb in the centre, with several small leaf-bulbs around it.

This successive formation of leaf-bulbs in bulbous-rooted plants, previous to the formation of a *flower-bulb*, is curiously analogous to the production of leaf-buds on many trees for several years, before the production of flower-buds: thus, apple-trees, raised from seeds, generate only leaf-buds for ten or twelve years, and afterwards annually produce both flower and leaf-buds. Hence it appears that the adherent lateral or paternal progeny, being the most simple and easy, is consequently the first mode of re-production; and that the propagation by seed is not accomplished till the maturer age or more perfect state of the parent-bud.

Bulbous roots are said to be *solid*, when composed of one uniform lump of matter, as in the tulip; *tunicated* or coated, when formed of a plurality of coats, surrounding one another, as in the onion; *squamous*, or scaly, when composed of lesser scales, as in the lily; *jointed*, as in the tuberous moschatel; *duplicate*, when there are only two bulbs to each plant, as in the crocus and saffron; and *aggregate*, when there is a congeries of such roots to each.

One of the most striking phænomena in vegetable nature, is that of raising plants from their bulbs, *without earth*. DUHAMEL even raised small *oak trees*, merely by water, in which he kept them eight years: they produced fine leaves every spring, and grew more rapidly during the two first years, than if they had been planted in the best earth: an useful hint this to the cultivators of that noble tree!

As bulbs immersed in water produce roots, stem, and leaves, we might be induced to think, that the order of their growth, in these different parts, would be alike; but experience evinces the contrary. DUHAMEL cut off some of the largest hyacinth-roots, almost two fingers breadth from their ends; then placed the bulb on a bottle, in such a position, that the end of the cut root touched the water; and made a mark on the outside of the bottle, exactly opposite to the extremity of the root; he likewise made marks corresponding to the ends of some entire roots. The latter continued growing, and soon extended beyond the mark of their former length; but the ends of the cut roots remained stationary. This experiment clearly demonstrates, that roots only grow at their end.

BULFINCH, or *pyrrhula*, a species of bird comprehended under the genus *Loxia*, and so generally known as to require but little description. The head, wings, and tail are black; the breast and belly red; the upper tail, coverts and vent, white; and the breast of an ash-colour. In the female, the under parts are of a reddish brown. This bird is common in most parts of the Continent, and throughout Russia and Siberia, at which last places it is caught for the table. It is also pretty general in England, and builds in bushes, five or six feet from the ground. The nest is principally composed of moss, and the eggs, which are five or six in number, are of a blueish white colour, marked at the large end with dark spots. The time of breeding is about the end of May, or the beginning of June; and in summer its principal residence is in woods; but in winter it approaches gardens and orchards, and is, perhaps, unjustly stigmatized for destroying the buds of trees, though it appears that its object is not the bud itself, but "the worm in the bud," and that the bulfinch is one of those species of birds that defend the embryo fruits, by destroying the nests of innumerable insects, and thus promote their growth. In its wild state, the bulfinch has a simple note, but when tamed, it becomes remarkably docile, and may be taught to whistle any notes, or even a whole tune, in the most accurate manner. There is a considerable number of these birds annually imported from Germany, some of which are even taught to speak, but they are remarkable for imitating wind-music, particularly flagelets.

When bulfinches are taken young, they may be reared in the same manner as a linnet. The best way to distinguish the cock of this bird from the hen, is, to pull half a dozen feathers from its breast, when about three weeks old, and in ten or twelve days after, they will appear of a brightish red.

BULL, or *Bos Taurus*, in zoology, is naturally a fierce and terrible animal, having cylindrical horns, bent outwards, and loose dewlaps. When chased, he has a majestic and sullen air, often tearing up the ground with his feet and

horns.

horns. A bull, like a stallion, ought to be the most handsome of his species. He should be tall and well made; his eyes large and protuberant, black and rolling; his forehead broad, and close set, with short curled hair; his ears long, hairy within and without; his horns longish, clean, and bright.—And as Nature has designed the head as his principal instrument, both of offence and defence, it ought to have every mark of strength, and also to be proportionably aided by the neck. The large muscular neck, provided it be well proportioned in its parts, and the head finely connected therewith, of all others deserves the preference.—It ought not, however, to be incumbered with a coarse wreathy skin and dewlap; the latter, on the contrary, ought to be thin and supple; and the former tight and smooth. The breast should be large, and the shoulders deep, thick, broad, and high; the back straight and broad; the ribs broad and circular; the belly deep, straight, and tapering a little to the hind thighs, which should be large and square. The roof ought to be wide, particularly over the chine and hooks; and the tail (if the bull is of the true *English* breed) should not extend far up the roof; and be strong and deep, with much lank hair upon the under part of it; and the hind part of the buttock rather square than exuberant; from which mark, there is an absolute, certainty he does not partake of the buffalo, or muscular thighed breed, which are the worst feeders. The joints and legs should be short and strong; and the body long, deep, and round, filling well up to the shoulder, and into the groin.

The finest breed of bulls, and other cattle, ever reared in this country, was that of the late Mr. Fowler, of Rollright, Oxfordshire; whose stock was sold by auction, in March, 1791. The editor of this work was among those who witnessed this enchanting exhibition of animals, and admired their incomparable size, form, vivacity, in short, the most picturesque view, both as to objects and scenery. Here the most respectable farmers of the first agricultural country in Europe had assembled; some of whom had travelled several hundred miles, from almost every corner of the island. Fifteen prime heads of cattle, namely, five bulls, and ten cows, were separately sold for the enormous sum of 2464l. or, on an average, 164l. each: the finest bull, named *Sultan*, only two years old, was purchased by Mess. Freeman and Eden, of Gloucestershire, at the price of 220l. 10s.—Such was the reputation of that celebrated breeder, Mr. Fowler, that Frederick the Great, of Prussia, honoured him with his correspondence, and rewarded him with a gold medal.

By well known artificial means, the nature of this animal is remarkably softened, and all his impetuosity destroyed, without diminishing his strength: on the contrary, after this operation, which is usually performed before he is two years old, his weight is increased, and he becomes more fit for agricultural purposes.

The age of these animals may be distinguished by the teeth and horns; the first four teeth drop out at the age of six months, and are succeeded by others of a darker colour, which are broader than the former. When they are sixteen months old, the next milk-teeth likewise fall out, and at the commencement of the fourth year, all the fore-teeth are renewed. The bull, cow, and ox, naturally live from fifteen to twenty years; but are generally killed at an earlier age.—See also Cow, and Ox.

These animals are extremely fond of licking themselves, especially when lying at rest; but this practice should, as much as possible, be prevented, for the hair being an indigestible substance, remains in the stomach, where it becomes coated with glutinous matter, which in time forms hard balls, and not unfrequently proves destructive. We conceive that small quantities of common salt, or preferably, rock-salt, occasionally exposed to cattle for licking it, would not only preserve their health, in general, but also tend to obviate the effects of the unwholesome practice before alluded to.

Dr. Lysons, of Bath, informs us, in his "*Practical Essays*," 1772, that the *epilepsy* in bulls, is sometimes occasioned by *hydatids* (little transparent bladders filled with water), or other matters immediately acting upon the brain; and he relates an instance where this formidable disease was cured by the operation of *trepanning*, performed by Mr. Cheston, a very ingenious surgeon, at Gloucester.

BULLOCKS, in this country, are most advantageously fattened by stall-feeding; a method now brought to systematic perfection.

The following is the result of experience, inserted in the eleventh volume of the "*Annals of Agriculture*," as communicated by J. H. Campbell, Esq. of Charlton, in Kent; who is one of the most judicious and successful graziers in the kingdom. He first remarks, that the quantity of food required to fatten an animal, depends entirely on the *thriving disposition*, and not in the least on his weight; and then gives the following answers to Mr. Young's queries: 1. One hundred bushels of potatoes, and seven hundred weight of hay, are generally sufficient to fatten any ox that is a tolerable good thriver. 2. Small quantities of potatoes should be given at first; then increased to one or two bushels per day, but always intermixing the dry food, and regulating the quantity of hay, by the effect which potatoes produce on the bowels. There ought to be at least five servings in a day, and according to the quantity an ox can be induced to eat with appetite, he will the sooner become fat, consequently the cheaper, and with more profit. The roots need not be cut, except in the beginning, to entice the animal to eat them; but they should always be fresh and clean. 3. There is no corn or meal necessary, unless it can be had at a moderate price; in which case it would tend to expedite, and consequently to render more profitable the whole of the feeding. Of this nature are brewer's grains, one bushel mixed with a peck of pollard, sometimes pea or bean-meal coarsely ground, given in two divided portions. 4. Cleanliness is a principal requisite in the feeding of cattle; hence not only the mangers, but also the stalls, ought to be kept as clean as possible; and the former should be cleared from dirt and dust, with a blunt-pointed trowel, every morning. After cleansing their stalls, a sufficient quantity of fresh litter should be

strewed

strewed over; which will invite them to lie down.—Mr. CAMPBELL is of opinion, and we fully agree with him, that rest contributes to fatten cattle much sooner; and likewise that combing and carding their hides, every day, promotes their thriving more than equal to the small portion of time thus consumed. Lastly, he found the greatest difficulty in prevailing upon the people, to whose care the bullocks were committed, to follow strictly his directions, and to abolish the practice of giving them too great portions of food at a time. Thus, the animal frequently becomes disgusted, his appetite is impaired, and the food is wasted. —The hay is to be cut once; or, if not very weighty, twice along, and three times across the truss, so as to be in squares of eight or ten inches: in this state the cattle eat and digest it more readily, while the fattening is considerably expedited.

BULL-RUSH, or Club-grass; the *Scirpus lacustris*, L. is an indigenous plant, frequently found in rivers, pools, and fens. It attains a height of from five to twelve feet, and is, near the root, about the thickness of a finger. Its spikes are dark-chesnut, or dark-brown with a tinge of red.

When fodder is exhausted, cattle will live upon this plant; and for that purpose it may be made into hay. Goats and swine eat it, but it is refused by cows and sheep. In Sweden, cottages are thatched; and, in Britain, pack-saddles are stuffed, with the bull-rush. Bottoms of chairs, and mats, are likewise very commonly made of it, and their finer or coarser quality depends upon the age of the grass. —From the pith, or medullary substance of this vegetable, a kind of paper may be prepared, by pressing it, and afterwards giving it consistence, by a proper addition of size.

BURDENS, or heavy loads, cannot fail to be injurious to the lungs; because the person carrying them is obliged to inspire and expel the air with greater force than is designed by Nature. Those who, either from imprudence, or a mistaken economy, exceed the limits of their strength, by doing at once what should be performed at two different times, expose themselves to various degrees of danger. Thus persons supporting heavy burdens, as porters, colliers, and day-labourers, in general, by over-straining the tender vessels of the breast and lungs, frequently become liable to blood-spitting, asthma, ruptures, pleurisies, &c. This fatality is apparently generated in early youth, from an absurd and hurtful notion, that the children of working people should be timely accustomed to hard labour. Every humane master of a family, as well as the more judicious neighbours of cottagers, ought seriously to warn those bold adventurers of the imminent danger to which they expose themselves by such imprudence. Young females, in particular, should be stopped in the streets, when walking with heavy loads on their heads; a measure no less necessary than that of removing an infant from the precipice of a window. From the pressure of such burdens, on the vessels of the brain, young persons become stupified; an effect which is obvious to every accurate observer. In countries, where the inhabitants carry all their water and other commodities on the head, many are afflicted with scrophulous complaints: but the worst consequences of this practice are, weak lungs, and a constant disposition to cough and catarrh, which frequently terminate in incurable consumption.

BURDOCK, or Clot-burr, the *Arctium Lappa*, L. a well-known plant growing on the road sides, on rubbish and ditch-banks, bearing purplish blossoms in July and August.

The blackish, but internally white root of this vegetable, might be very advantageously employed in washing, on account of its saponaceous property. Before the flowers appear, the tender stems stripped of their rind, are boiled and used like asparagus; or eaten with vinegar and the yolk of eggs, rather than oil, in the form of salad.—The plant is browsed upon by cows and goats, but refused by sheep and horses; nor is it relished by swine.

Böhmer mentions the root of the burdock, among those vegetables from which starch may be extracted; and Schaefer obtained from the stalks a whitish green paper. Boys catch bats with its flowers. See the article Bat, p. 185.

In medicine, says Dr. Withering, decoctions of the burdock-root are esteemed, by judicious physicians, as equal, if not superior to those of sarsaparilla. The fresh root has a sweetish bitter, and somewhat austere taste; is aperient, diuretic, and sudorific; and said to act without irritation, so as to be safely used in acute diseases. The seeds have a bitterish, sub-acrid taste, and are recommended as powerful diuretics, when taken either in the form of an emulsion, or a powder, in doses not exceeding one dram.

BURDOCK, the Lesser, or *Xanthium strumarium*, L. likewise a native plant growing on dung, and grounds highly manured: the thornless stem is a foot and a half high, thick, often spotted; the leaves heart-shaped, lobed, on long foot-stalks; flowers from June to September.—The leaves are bitter and astringent: they are eaten by horses and goats, but refused by cows, sheep, and swine.—A decoction of the whole plant yields a bright yellow colour; which, however, is more lively, when the flowers alone are employed.

BURGOO, a kind of porridge, is a nutritive dish, eaten by mariners, and much used in Scotland: it is made by gradually adding two quarts of water to one of oatmeal, so that the whole may mix smoothly; then boiling it for a quarter of an hour, stirring it constantly; after which, a little salt and butter should be added. This quantity, prepared as directed, will serve five or six persons for a meal; and Cockburn considers it very proper for correcting that unwholesome disposition to costiveness, so frequent to persons of a sea-faring life.

BURIAL, the interment of a deceased person. The rites of burial have been, at all times, and in every civilized country, considered as a debt so sacred, that those who neglected to discharge it, were justly detested. It is, therefore, not a matter of surprize that the Greeks and Romans were extremely solicitous about the burial of their dead; as, in their opinion, the souls of their departed friends could not gain admittance into Elysium, till their bodies were committed to the earth. Hence, in ancient times, it was deemed a duty incumbent upon every traveller, who should happen to meet with a dead body in his way, to cast three handfuls of dust or mould upon it. The honour of burial was, however, denied to tyrants, traitors, and those who had committed particular crimes, and were punished with death.

Among the primitive Christians, interment in cities was not permitted for the first three centuries, nor in churches for many ages after, and hereditary burying places were forbidden till the 12th century. That the extravagant abuse of burying in churches is highly infectious, on account of the exhalations arising from the putrid bodies, must be evident to the meanest capacity. This absurd and pernicious custom is of early origin: for the honour was at first conferred to the sacred relics of martyrs; and in the ninth century it was allowed also to persons of distinction: the same privilege was granted to those who revered the shrines—the clergy and monks making the faithful believe, that to place them in the repository of the bodies of saints, was the greatest mark of dignity they could receive. Although this custom still prevails, yet nothing can be more detrimental to the health of the living, even though the vaults should remain closed; because there is a continual putrid exhalation of noxious vapours, particularly in the hot days of summer. Hence this may be considered as the real cause of many disorders, which are erroneously attributed to the various, and often sudden, changes of the atmosphere.

Premature Burial, a complaint which, in modern times, has excited the attention of many judicious inquirers, and become lately the subject of public investigation, in several States of Europe. It is a well attested truth, that many unfortunate persons are consigned to the grave, before they are actually dead; and that individuals, subject to epilepsy and apoplectic fits, have often been too hastily buried, or more properly *smothered* in their coffins. To prevent such fatal accidents, houses for the reception of dead bodies have, within these last ten years, been erected in various cities of Germany, where every inhabitant has a right to deposit the body of a deceased person, till putrefaction has actually commenced. We forbear to expatiate on the propriety and utility of a measure, which can be censured only by obstinate and superstitious Jews, who, from an old religious injunction, are enjoined to bury their departed friends on the same day, and before sun-set.

With respect to the method of ascertaining the probable causes, and most evident symptoms, of *actual dissolution*, we refer the reader to the article "Apparent Death;" and shall here only observe, that the *first* stage of putrescency may be distinguished by the oily nature of the humours exuding through the pores, and forming a perceptible clamminess on the surface of the body. The exhaling vapour is accompanied with a faintish or slightly cadaverous odour, which marks with precision the point of time for interment. In the *second* stage, the emanating vapour is sensibly alkalescent, with a strongly putrid and offensive smell, which may alone prove noxious to the attendants. On the contrary, in cases of cancer and mortification, the putrid effluvia proceeding from vital heat and motion, ceases after death, or as soon as the body becomes cold: hence the two cases are so distinct, that they cannot be easily mistaken.

BURNET, the Great, or Wild, or Meadow Burnet; the *Sanguisorba officinalis*, L.; a native plant growing on moist pastures, especially on a marly and calcareous soil, in the North of England. It is a hard, woody plant, and grows from two to three feet high, branching towards the top, and terminated by thick oval spikes of flowers, of a greyish brown-colour, which appear in June and July.

This vegetable ought not to be confounded with the following, or the Upland Burnet, which is a very different genus of plants. The Great, or Wild Burnet, has been usefully employed in the art of dyeing. Vogler dyed wool, silk, linen, or cotton, in a decoction of the dried, brown-red flowers, of a grey colour with a greenish shade, by the addition of alum; of a dark lilac, which soon assumed a beautiful grey, by adding a solution of tin; and of a deep black colour, on dropping into the liquor a solution of copperas.

According to Bechstein, the whole of the wild burnet is used in tanning leather, as a substitute for oak-bark: and the plant is also relished by cattle, especially by sheep.

BURNET, the Upland, or *Poterium sanguisorba*, L. is likewise a native plant, and by some called the Common Garden Burnet, though it grows wild in a dry calcareous soil. It has fibry perennial roots, and retains its leaves throughout the year, but the stalks are annual: it has long been cultivated as a choice salad-herb in winter and spring. The leaves, being of a warm nature, are also used in cool tankards, and for imparting an agreeable flavour to wine. When bruised, they smell like cucumber.

With respect to the more or less profitable culture of this plant, the opinions of *practical* farmers are divided. At the head of those who have discouraged the introduction of this grass, are the late eminent botanist, Mr. Miller, and Dr. James Anderson, one of the most skilful and celebrated writers on agriculture. The former asserts, in his Dictionary, that the plants are left uneaten by the cattle when the grass about them has been cropt to the roots; that in wet winters, and in strong lands, the plants are of short duration; and that the produce is insufficient to tempt any person of skill, to engage in its culture: the latter, in his *Essays on Agriculture*, also affirms, that the produce of burnet is too small to be worth cultivating.

On the other hand, we meet with several authorities by whom the upland burnet is strongly recommended as proper food for cattle, on account of its partaking of the nature of evergreens, and growing almost as quickly in winter as in summer.

For the first introduction of this plant into arable fields, we are indebted to Bartholomew Rocque, an honest farmer of Walham Green, near London; who, in March, 1761, sowed six pounds of the seed upon half an acre of ground, with a quarter of a peck of spring-wheat; but the seed being very bad, it came up but sparingly. Not discouraged by this failure, he sowed two other pounds in the beginning of June, upon about six rood of ground, which he mowed in the beginning of August; and at Michaelmas transplanted them on about twenty rood of ground, at the distance of one foot each way, taking care not to bury the heart. These plants bore two crops of seed in the following year; the first about the middle of June, and the second about the middle of September. In the second year, also, two good crops of seed were produced. As it could not be cut after September, he let it stand till the next year, when it sheltered itself, and grew very well through the winter, except during a hard frost, when it, nevertheless, remained green. In March, it covered the ground, and was fit to receive cattle. It may be mown three times in one summer, just before it begins to flower. From six rood of ground, he obtained 1150 pounds at the first cutting of the third year; and was enabled to sell, in autumn 1763, no less than three hundred bushels of the seed!

The next authority is that of the Rev. DAVIES LAMBE, Rector of Ridley, in Kent, whose letter to Dr. TEMPLEMAN, the first Secretary to the Society for the Encouragement of the Arts, &c. is dated December 10, 1765. From the particulars of his statement it appears, that one acre of land, at two mowings, produced ten quarters of seed, and three loads of hay; that burnet-straw is a very useful fodder for horses, calves, cows, and sheep; and that the chaff is also valuable, when mixed with any other, for feeding cattle of every description. Mr. LAMBE is fully persuaded, that burnet will prove a very great acquisition to husbandry, on many accounts; but more particularly for the following reasons: It is a good winter pasture, consequently it will be of great service to the farmer, as a constant crop he may depend on, and that without any expence for seed or tillage, after the first sowing; whereas turnips are precarious and expensive; and when they fail, the farmer is very often put to great inconveniencies to keep his stock. It never blows or hoves cattle, and will flourish upon poor light sandy, stoney, or chalky land. After the first year, it will weed itself, and be kept clean at little or no expence.

The cultivation of burnet is neither hazardous nor expensive: if the land be prepared, as is generally done for a crop of turnips, there is no danger of any miscarriage. It very frequently happens, that every farmer, who sows many acres with turnips, finds several of them produce little or nothing; the fly, the dolphin, the black caterpillar, the dry weather, or some unknown cause, often defeating the industry and expence of the most skilful husbandman. When this happens, as is too often the case, it is advisable to sow burnet, and in March and April following, he will have a fine pasture for his sheep and lambs.

Mr. W. PITT, a respectable farmer of Pendeford, Staffordshire, when speaking of the culture of the upland burnet, informs us, that one of his neighbours has observed in it this valuable property as a meadow-grass, that it preserves the hay from over-heating in the stack; and that the hay of a meadow in his possession, which contains naturally a considerable portion of this grass, always comes from the stack of a fine fresh green colour, while his other hay, without this plant, was overheated, and turns out quite brown. The plant itself makes very good hay; and, even after threshing out the seed, is eaten as eagerly by horses as the best clover-hay, but is less luxuriant in its growth than the *broad red clover*; the produce per acre not exceeding two-thirds of that obtained from the last mentioned vegetable, in the same field.

T. Le Blanc, Esq. of Cavenham, Suffolk, sowed in October, 1782, a space several perch square, with burnet-seed and rye, being a part of 100 acres laid down to rye-grass, trefoil, and white clover; the soil was a blowing sand upon a chalk bottom, worth about 3s. 6d. per acre. It was folded for the rye. A flock of between six and seven hundred sheep were turned in on the 5th of April, 1784. The grasses were, in general, backward, but the burnet, in its growth much more forward than the rest. For the first two or three days, the sheep did not eat it at all; a fortnight after, he viewed it again, and found the burnet eaten to the ground. On examining it again, June 4th, it was pared close. When a flock has so large a range as 100 acres, and eat up the growth of any small spot so clean, it is a far more satisfactory proof that they have no dislike to the plants growing there, than if they were confined to a small field with no other herbage.

In the second volume of Dossie's *Memoirs of Agriculture*, Mr. Barber asserts, that burnet improves land from six shillings to one pound per acre; and though sheep do not like it at first, they will at length relish it: he also supposes, it prevents the rot in these animals.

For the more successful culture of burnet, we shall point out the following concise directions, being the result of B. Rocque's experience, whom we have mentioned as its first cultivator in England: 1. Although it flourishes on stony and gravelly, as well as in strong lands free from water, yet it will succeed better on a dry soil: nor will it thrive on grounds newly broken up; which are best seasoned with potatoes. 2. It may be sown in April, May, June, July and August, and will appear above ground in about eight or nine days. 3. The soil should be worked very fine with a harrow, and rolled; twelve pounds of seed are sown to an acre, when it should be slightly harrowed and rolled again. 4. The first year it must be kept very clean; and in the next, it will become strong enough to choak all other grasses, for no drought stints it, and no frost destroys it. 5. As the seed sheds, when ripe, it should be cut in the morning while the dew is upon it, and threshed the same, or the next day: those who wish to save the seed, should feed the grass till May, as otherwise it will be too rank, and lodge; in a green state, it is heavier than any other pasture-grass. 6. If two horses are allowed to an acre, it will grow faster than they can eat it: the first crop purges them as effectually as the strongest physic; which, however, is the case only for three days. Mr. Rocque also affirms, that he kept a horse entirely on burnet; that it cures these animals of the distemper called the *grease*, but that this effect is produced only by the first crop; and that he recovered one, which was considered as incurable by any other means.

Lastly, it deserves to be noticed, that burnet increases the quantity of milk in cows, and produces good butter:—it is likewise maintained, that the mutton of sheep fed on it, is more juicy, better coloured, and flavoured, than that from any other food; while it not only cures the rot in sheep, but also recovers such as have scowered.

Burnet-Saxifrage. See Anise.

BURNING, the action of fire on fuel, the minute parts of which are thereby put into violent commotion, so that some of these particles assume the nature of fire, and escape, while the remainder is either dissipated in the form of vapour, or reduced to ashes. There are many instances on record, of persons who have been burnt to death by fires kindled in their own bodies: but such individuals generally had long indulged to excess in spirituous liquors.

Burning, in surgery, denotes the application of the actual cautery, or a red hot instrument, to the part affected. In the Mogul empire, the natives cure, or pretend to cure the colic, by applying a ring, red hot, to the patient's navel; and among the Japanese, the practice of burning constitutes nearly the whole of the healing art. It is, however, certain, that several very extraordinary cures have been performed by burning: and the ancients frequently had recourse to this remedy, with singular advantage.

Burning-Glass, or burning mirror, a machine by which the sun's rays are collected into a point, and thus their force and effect considerably increased, so as to consume objects within its reach.

There are two kinds of burning glasses, namely, *convex* and *concave*. Those of the convex form are lenses, which, by acting according to the laws of refraction, incline the rays of light towards the axis, and unite them in a point, or focus. The concave ones are mirrors, or reflectors, whether made of polished metal, or silvered glass; which, by the laws of reflection, throw back the rays into a point before the glass.

These instruments are undoubtedly of very ancient origin: the most celebrated were those of Archimedes and Proclus; by the former of which the fleet of Marcellus was destroyed, at the distance of a bow-shot. In modern times, there have been several inventions of this kind, remarkable for their large diameter, and powerful effects; the principal of which are those of Magine, of Sepatala, Settala, and Buffon; the latter of whom made one that consisted of 400 mirrors, which reflected all their rays to one point, and with this he could melt lead and tin, at the distance of 140 feet.

Sir Isaac Newton presented a burning-glass to the Royal Society, which consisted of seven concave glasses, so placed that all their foci join in one physical point. This instrument virtifies brick or tile in one second, and melts gold in half a minute.

Burning of Land, or *Burn-baiting*, a practice long employed in agriculture, but now nearly abandoned. It is performed by cutting off the turf of the ground, piling it in heaps to dry, and afterwards burning it to ashes, which are spread over the bare surface and ploughed in. Many consider it as a very profitable method of dressing, for it need only be used on the poorest, and worst kind of lands, or barren, rushy, and heathy grounds, that have long been untilled. By this useful practice, an excellent crop may be obtained from the most impoverished soil; though the effect does not continue longer than three years, when the ground becomes as poor as it was before.

Land may be so much exhausted, by repeated crops after burnbaiting, as not to receive benefit from any thing, till recruited by ten or twelve years fallow: hence the farmer should, after the first crop, prepare for the second, by the addition of any common manure.

A correspondent in the "*Museum Rusticum*," ascribes the neglect of this system to the following causes: 1. The poverty of many small farmers, who, holding their estates at a rack-rent, will not venture to lay out such a considerable sum on lands, which they may probably quit before their money will be returned. 2. Landlords, observing the parsimonious conduct of farmers, in working out the land, and thinking of no improvement beyond the present crop, are, in general, averse to this expdient, and will not grant permission to their tenants to adopt it.

Bastard burn-baiting. This practice consists of burning the refuse product of the land, such as stubble, haulm, &c. upon the ground which produced them; or whatever else is laid on it, for that purpose. It may be considered under *four* heads: 1. The burning of sedge on wet lands; a very old and successful practice. 2. Burning the stubble upon corn-fields; which is also an ancient and common method; and though the ashes thus produced are light, and not abundant, yet the heat imparted to the ground, makes such a dressing better than four times the quantity of ashes of another kind. 3. The burning of any waste product on heaths and commons; the benefit of which is not sufficiently known: this is performed by stubbing up the broom, or other waste matter, piling it in heaps, and covering them with the earth that had been raised in digging to the roots; then burning the whole, and spreading the ashes on the ground, to be ploughed in. 4. The bringing of certain substances to impoverished land, and burning them there; such as sticks, stubble, haulm, or other waste matters of any kind. The principal advantage of this last method does not so much consist in the quantity of ashes produced, as in the enlivening warmth communicated to the ground, by such a number of small fires, which greatly contribute to promote its fertility.

BURNS may proceed from fire, as well as a fluid body; which latter may be either heated, or consist of corrosive mineral acid, such as aqua fortis, oil of vitriol, &c. In this place, we shall treat only of burns occasioned by *fire*, and refer the reader for an account of other accidents of this nature, to the head of "SCALDS."

In slight cases, the burnt part may be held for a minute near the fire; or, if it be a finger, the pain and inflammation will be abated by bringing it in contact with the ear; which, in this instance, acts like a conductor. Ink, the juice of onions, or a little brandy, or even salt rubbed on the part affected, all tend to prevent blisters;

but if these, nevertheless, should rise, open them with a lancet, or a fine pair of scissars, without cutting away the scarf-skin, let out the collected humour, and then apply a mixture of oil and lime-water, beat up with a new-laid egg, spread upon soft linen rags, and renewed every hour, or oftener.

One of the most simple remedies in *recent* burns, and which is in great vogue on the Continent, consists in the expressed juice of the burdock, or clot-burr; the fresh and tender leaves of which possess healing virtues, and are therefore applied not only to burns, but also to wounds, ulcers, &c. There is a kind of green ointment kept in families for occasional use: it is composed of equal parts of the juice obtained from the middle leaves of the burdock, and oil of almonds, or olives, in the purest state. This composition is said to be of singular efficacy, also, in healing ulcers, allaying pain arising from piles, removing tetters, and suppurating pustules of the face, if assisted by internal remedies, adapted to particular cases.

BURNT-GRAIN, a distemper incident to corn, and frequently confounded with the *smut*, though in its nature, very different from the latter. According to DUHAMEL, the husks, or external coverings of the grains in burnt ears, are, in general, tolerably sound, with this difference only, that when the seeds begin to ripen, they appear drier and more parched than those of the healthy ears. The skin, or bran, which forms the immediate covering of the grain, is not destroyed in this disease, as is the case in the smut: and the infected ears are less firm and consistent in their texture, than the sound ones: the husks of the former also become dry and whitish, in proportion to the increase of the distemper. The grains retain some degree of firmness, and if opened, are found to be full of a brownish substance, emitting a nauseous smell, and being unctuous to the touch.

The most effectual method of preventing a distemper, the cause of which is as little known as that of the smut, is first to wash the seed well in common water, and scum off all the damaged grains that float on the surface, then to steep it in brine, a strong ley of ashes, urine, &c.; lastly, to sprinkle it well with quick-lime, before it is sown.

BUR-REED: See BURWEED.

BURYING-GROUNDS are places consecrated to the interment of dead bodies; and have, from the earliest institutions of society, been held in great veneration, both by Heathens and Christians. It is, however, to be regretted, that the latter paid less attention to the influence of such places on the health and comforts of the living, than the more sagacious Pagans, who generally appointed distant and elevated situations, for committing the remains of their friends to the maternal earth.

There can be no diversity of opinion as to the pernicious tendency of burying-grounds in the vicinity of dwelling-houses (see the Article BURIAL), especially in large and populous cities. Hence Dr. DARWIN, in the true spirit of a philanthropic philosopher, boldly, though pertinently, remarks: No burials should be tolerated in churches or church-yards, where the monuments of departed sinners shoulder God's altar, pollute his holy places with dead men's bones, and, by putrid exhalations, produce *contagious*

gious diseases among those who frequent his worship. Proper burial places should be consecrated out of towns, and divided into two compartments: the earth from one of these should be removed once in ten or twenty years, for the purposes of agriculture, when it will be sufficiently saturated with animal decomposition; and sand, or clay, or even soil that is less fertile, should be substituted. Dr. DARWIN farther thinks, that the removal of this earth is not likely to shock the relations of the deceased, as the superstition concerning the clay, from which we rose, and into which we return, has gradually vanished before the light of reason. Instances of this happy change occurred, about thirty years ago, in removing a quantity of rich earth from the close of the cathedral at Lichfield; and more lately, in changing a burying-ground at Shrewsbury, both which were executed without exciting superstitious terror, or popular commotion. Although we cannot, in conformity to our professed sentiments, and in justice to the Doctor's benevolent design, on this occasion differ as to the propriety of the expedient he has suggested, yet we doubt whether the tide of prejudice, which influences the multitude, is not, at present, too powerful an obstacle to such innovations. Before attempts of this nature can be made with any hope of *permanent* success, we venture to say, that much remains to be previously done in our schools, as well as in private education, to unfetter the young mind from the chains of dogmatical slavery, and to inculcate principles of *untainted morality*, being the most substantial basis of *pure Christianity*.

BUSH-VETCH, or the *Vicia sepium*, L. an indigenous plant, growing in woods, hedges, pastures, and meadows. Its leaves are doubled together; bunches shorter than the leaves; the stem upright, sometimes four feet high; the blossoms of a dirty purple, and appear in May and June. This plant shoots earlier in spring than any other eaten by cattle; vegetates late in the autumn, and continues green all winter.

Although the culture of the bush-vetch was strongly recommended by Dr. ANDERSON in 1777, yet from later experience, it appears that it is difficult to collect the seeds, as the pods burst, scatter them about, and being made the nest of an insect, scarcely a third part of them will vegetate. Dr. WITHERING, however, observes, that a spot of garden-ground, sown in drills with this vetch, was cut five times in the course of the second year, and produced at the rate of 24 tons per acre of green food, which, when dry, weighed nearly 4½ tons.—The Rev. Mr. SWAYNE also informs us, in the third volume of the papers of the Bath Society, that he selected part of a field in which the bush-vetch naturally abounded, sowed it with this plant, and it succeeded so well, that he cut it four times in the same year; the produce of the hay was 24 tons 11¾ cwt. per acre, which is upwards of one-third more than lucerne generally produces. But Mr. SWAYNE has since observed to Dr. WITHERING, that though the bush-vetch is very palatable to all kinds of cattle, its cultivation, on a large scale, would be attended with difficulty, as the seeds are generally devoured by a numerous species of insects.—It is farther remarkable, that ants are extremely partial to this vegetable.

BUSHEL, a measure of capacity for dry substances, such as grain, pulse, fruit, &c.; it contains, in general, four pecks, or eight gallons; being the eighth part of a quarter.

According to the earliest excise-laws, a *London bushel* is to contain *eight* wine gallons of wheat; the gallon, *eight* pounds of wheat (TROY-WEIGHT, which see); the pound, *twelve* ounces; the ounce, *twenty* penny-weights; and each penny-weight, *thirty-two* grains, or corns, of wheat taken from the middle of the ear. But as such grains are of very different weight in different ears, nay, in the same ear, and even in the same field, the uncertainty of this calculation must be obvious. Nevertheless this *standard* bushel is kept in the Exchequer: when filled with common spring-water, and measured before the House of Commons in 1696, it was found to contain 2145,6 solid inches; and the same water being weighed, amounted to 1131 ounces, and 14 penny-weights, troy. The first malt-act, however, altered these proportions, as it was then enacted, that the legal *Winchester bushel* should be 18½ inches diameter, and eight inches deep. The coal-bushel was regulated at 19½ inches wide:—thus, says Mr. RENARDSON, in the 491st number of the "*Philosophical Transactions*," two measures, both differing from the original one, were legally established; and from time to time innovations were made, till it became difficult to determine, what was meant by the name of any measure.—Beside this inconvenience, the bushel has, in different counties and places, and without any apparent cause for such diversity, been made of different dimensions: at Abingdon and Andover, a bushel contains nine gallons; at Appleby and Penrith, a bushel of peas, rye, and wheat, holds 16 gallons; of barley, big, malt, mixt malt, and oats, 20 gallons. A bushel contains, at Carlisle, 24 gallons; at Chester, a bushel of wheat, rye, &c. is 32 gallons; and of oats, 40; at Dorchester, a bushel of malt and oats is 10 gallons; at Falmouth, the bushel of stricken coals is 16 gallons; of other articles, 20, and usually 21 gallons; at Kingston-upon-Thames, the bushel contains 8½; at Newbury, 9; at Wycomb and Reading, 8¾; and at Stamford, 16 gallons.

In ascertaining the accurate weight of a bushel of corn, there is a considerable difference arising both from the nature of the grain, and its relative perfection: thus, a bushel of oats weighs only about 40 pounds; of peas and beans, about 60; and the best wheat should weigh from 62 to 64 pounds.—With greater accuracy, however, may be calculated the cubic, or solid capacity of vessels; so that a bushel containing 2145 inches, will be nearly equal to one foot and a quarter cubic measure: consequently a body of a cart, comprising forty feet, will hold about thirty-two bushels, stricken measure.—If a calculation be made as to the number of perfect grains of wheat, which ought to be in one standard bushel, it will be found that the net amount is 491,520 grains, or 7680 to one pint, or pound.

BUSTARD, or *Otis tarda*, in ornithology, is said to be the largest of the British land-fowl; its breadth, with expanded wings, being nine feet; the length nearly four; and the male weighing from 25, to 27 pounds.—The female is about half the size of the male, and marked with different shades of colour.

Bustards inhabit most of the open countries lying to the south and east parts of this island, from Dorsetshire, as far as the Wolds of Yorkshire. In autumn, they are (in Wiltshire) generally found in large turnip-fields, near the Downs, and in flights of fifty or more. They are exceedingly shy, and difficult to be shot; run very fast, and fly, though slowly, many miles without resting: and, as they take flight with difficulty, they are sometimes run down by greyhounds. Corn and other vegetables are their usual food; but they are very fond of those large earth-worms which appear in great numbers on the downs, in the summer-mornings, before sun-rise. These are replete with moisture, answer the purpose of liquid food, and enable them to live long without drinking. Nature has provided the males with an admirable magazine for their security against drought; being a pouch, the entrance of which lies immediately under the tongue, and is capable of holding near seven quarts; this they probably fill with water, to supply the females when sitting, or the young before they are fledged. Bustards lay only two eggs, resembling those of a goose, of a pale olive-brown, marked with spots of a dark colour: they build no nest, but only scrape a hole in the ground.

BUTCHER, a person who slaughters cattle for the use of the table; cuts up and retails meat. Although, by the constitution of this country, the butchers are not so restricted as they were in ancient Rome, nor in such high reputation for skill and shamble-learning, as they are among the Jews, yet there are proper laws enacted for regulating their trade, and preventing the abuses committed by them, and their servants, if they were duly enforced.—A butcher selling swine's flesh measled, or dead of the murrain, shall, for the first offence, be amerced; for the second, stand in the pillory: for the third, be imprisoned, and pay a fine; and, for the fourth, abjure the town. Those who exact unreasonable prices for their meat, shall forfeit double the value; they are also occasionally fined for forestalling, &c. but perhaps never for BLOWING (which see), as few persons are inclined to complain, when redress of grievances is attended with loss of time and trouble.

It appears that our legislature has affixed such an imputation of proneness to shed human blood, upon persons who slaughter brute creatures for a subsistence, that, by the laws of England, no butcher is permitted to serve on a jury, when sitting on the life of a fellow-subject.

With respect to the unlawful dealings of *carcass-butchers*, it has often been maintained, and we apprehend, upon good grounds, that they are a tax upon the necessaries of life, a toll upon the market, a chief cause of *artificial* famine; in short, the worst class of usurers.

Dr. BUCHAN justly censures the practice adopted by butchers, of filling the cellular membranes of animals with blood. Thus the meat appears fatter, and weighs more than it would do in its natural state, while it is rendered unwholesome, and unfit for keeping. See also BALANCE.

BUTCHER'S BROOM. See KNEE-HOLLY.

BUTTER, an artificial preparation of cow's milk; which, either in its entire state, or in that of cream, is agitated for a considerable time, till all its unctuous particles are separated from the whey, and a soft consistent mass is formed.

The Greek writers, though frequently speaking of milk and cheese, do not mention butter: and the Romans, while they lived without physicians for six centuries, never used it as an article of food, but only as a medicine. In modern times, the art of making, improving, and preserving butter, has kept pace with the unwholesome custom of eating this animal oil, from an early period of infancy. Thus, we have reason to think that many diseases of children, especially those of a scrophulous nature, are wantonly induced, or at least rendered more malignant.

As butter is, at present, used in our daily food, chiefly on account of its agreeable taste, we shall first speak of its physical properties.—To render it less hurtful, it ought to be perfectly fresh, and free from rancidity; which it easily acquires, if the butter-milk has not been completely separated. Fried, or burnt butter, is still more detrimental to health; as it is thus converted into an acrid, and even caustic fluid, which cannot fail to disorder the stomach, to render digestion difficult and painful, to excite rancid belchings, and, ultimately, to taint all the fluids with a peculiar acrimony. Hence, toast and butter should never be eaten by persons who value their health; as there are many who, even by fresh butter, are affected with those inconveniencies. Nor can we recommend the prevailing custom of melting butter with flour and water; for, in this manner, it forms a compound more indigestible, than sweet butter is in its natural state.

Notwithstanding the injurious tendency of butter, especially after it is salted, this substance forms a considerable article of trade. It is affirmed that not less than 50,000 tons are annually consumed in London; of which the counties of Cambridge and Suffolk are said to furnish 50,000 firkins, each containing 56lb. None, however, is equal to that produced in Essex, and known by the name of *Epping butter*, which was formerly sold at from 12d. to 14d. per pound avoirdupois; but, lately, at the exorbitant price of 1s. 8d.

With respect to the various methods of making butter, we shall state only those practised in Essex; to enable the reader to select the most useful parts of the different processes, and apply them to particular situations.

The Epping method has been described by Mr. JOSIAH HAZARD; from whose directions we extract the following particulars: After having stated the proper requisites for a DAIRY-HOUSE, which we shall communicate under that head of the alphabet, he observes, that a good milch-cow may be worth from 7 to 10l. a year, whereas an indifferent one will bring in no more than from 5 to 6l. during the same period: hence the farmer should never keep any but such as afford an abundance of milk. No milk must be suffered to remain in the udder, as by this neglect the cow will give less every meal, till at length she becomes dry before her proper time, and, the next season, will scarcely give sufficient to repay the expences of keeping her.

If a cow's teats are scratched, or wounded, her milk will be foul, and should not be mixed with that of other cows, but given to pigs. In warm weather, the milk should remain in the pail till it is nearly cool, before it is strained; but, in frosty weather, this should be done immediately, and a small quantity of boiling water mixed with it; which will produce cream in abundance, especially in pans, or vats, of a large surface.

During the hot summer-months, the milk should stand only 24 hours, and the cream be skimmed from it, either early in the morning, before the dairy becomes warm; or in the evening, after sun-set. In winter, the milk may remain unskimmed for 36, or even 48 hours; the cream ought to be preserved in a deep pan, kept, during summer, in the coolest part of the dairy, or in a cool cellar where a free air is admitted. Dr. ANDERSON (whose aphorisms on this subject we shall qnote at the conclusion of the present article), is of opinion, that the temperature of a dairy should, if possible, be kept between 50 and 55° of Fahrenheit; which is nearly about the average temperature of a building secured from the external air, in the manner he has proposed; and a delineation of which the reader will find under the article MILK-HOUSE.

Those, who have not an opportunity of churning every other day, should shift the cream daily into clean pans, in order to keep it cool; but they should regularly churn twice a week in hot weather, and this in the morning before sun-rise, taking care to fix the churn in a free draught of air. Nor should this vessel be exposed to a fire so near as to heat the wood in cold seasons, as by this means the butter will acquire a strong rancid flavour.

A correspondent in the Papers of the Bath and West-of-England Society observes, that the operation of churning may be much facilitated, by adding a table-spoonful or two of distilled vinegar to a gallon of cream, but not till after the latter has undergone considerable agitation. When the butter is churned, it should immediately be washed in several waters, till it be perfectly cleansed from the milk; but a *warm hand* will soften it, and make it appear greasy. Hence it is advisable to employ two pieces of wood, such as are used by cheese-mongers; an expedient by which those who have naturally a very warm hand, might render their butter more saleable. See CHURNING.

In many parts of England, butter is artificially coloured in winter; though this process adds nothing to its goodness. The farmers in and near Epping, take sound carrots, the juice of which they express through a sieve, and mix with the cream, when it enters the churn; which makes it appear like May-butter. There is very little salt used in the best Epping butter; but it is a fact, that a certain proportion of acid, either natural or artificial, must be used in the cream, in order to ensure a successful churning: some keep a small quantity of the old cream for that purpose; some use a little rennet, and others a few tea-spoonfuls of lemon-juice.—Cleanliness in the dairy is, at all times, an essential requisite.

The Lancashire method of preparing milk for butter, is as follows: The whole milk is divided into two parts; the first drawn being set apart for family use, after being skimmed; the cream of which is put into proper vessels, as also the whole of the second, or last drawn milk, provincially called *afterings*. These two, being mixed together, are stirred, but not to a great depth, to prevent the bad effects of foul air accumulating on the surface, and kept, according to the season of the year, exposed to the fire, for promoting the acetous fermentation, which is accelerated by the acid remaining in the pores of the vessels. For this reason they are not scalded, except after having contracted some taint; and, in this case, they are sometimes very expeditiously rinsed out with sour butter-milk: during this preparation for *souring*, the milk is kept ready for the churn; and, in consequence of such treatment, more butter is obtained, and of a better quality, than if the milk were churned in a sweet state.

Decisive experiments have been made, in order to ascertain whether it be more profitable to churn the whole milk, or only the cream which the milk produces: it was found that one day's milk of a particular cow, churned by itself, yielded only 12 oz. of butter; and the cream of two days milk produced 3 lb. 2 oz. Hence it appears to be more profitable to collect the cream, and churn it, than to churn the whole milk. Cream-butter is, likewise, the richer of the two, though it will not keep so long sweet.

In justice to Dr. JAMES ANDERSON, who has favoured the public with an excellent Essay "*on the Management of the Dairy*," inserted in the correspondence of the Bath and West-of-England Society, we shall communicate a few of his aphorisms: 1. The first milk drawn from a cow is always thinner, and of an inferior quality to that which is afterwards obtained; and this richness increases progressively, to the very last drop that can be drawn from the udder. 2. The portion of cream rising first to the surface, is richer in quality, and greater in quantity, than what rises in the second equal space of time, and so forth: the cream continually decreasing, and growing worse than the preceding. 3. Thick milk produces a smaller proportion of cream than that which is thinner, though the cream of the former is of a richer quality. If, therefore, the thick milk be diluted with water, it will afford more cream than it would have done in its pure state; but its quality will at the same time be inferior. 4. Milk carried about in pails, or other vessels, agitated, and partly cooled, before it be poured into the milk-pans, never throws up such a good and plentiful cream as if it had been put into proper vessels immediately after it came from the cow.

Dr. ANDERSON, in the same paper, imparts the following judicious hints: The milk should be forced out of the cavities of the butter with a flat, wooden ladle, or skimming dish, provided with a short handle; and this should be dexterously performed, with as little working of the butter as possible; for if it be too much beat and turned, it will become tough and gluey, which greatly debases its quality. To beat it up by the hand, is an indelicate practice. It is also very detrimental to pour cold water on the butter, during this operation. If the heat should be so great, as to render it too soft to receive the impression of the mould, it may be put into small vessels, allowed to swim in the trough of cold water under the table; preventing, however, the water from touching the butter: thus it will, in a short time, acquire the necessary degree of firmness, especially if a small piece of ice be put into the vessel. The Doctor, on this occasion, severely censures the practice that prevails in many private families, of keeping fresh butter in water, and thus bringing it to table in a glass vessel. If coolness only is wanted, he advises to put the butter into a dry glass, and immerse this into cold water: and if it be taken out immediately before it is used, such butter will, in our climate, always have sufficient firmness.

After the butter has been beaten up and cleared from the milk, it is ready for being salted. The vessels intended for this purpose, being rendered perfectly clean, should be rubbed in the whole inside with common salt; and a little melted butter should be poured into the cavity, between the bottom and the sides: thus prepared, they are fit to receive the butter.

Although common salt is generally employed for preserving butter, yet Dr. ANDERSON has found by experience, that the following composition not only preserves the butter more effectually from any taint of rancidity, but makes it also look better, taste sweeter, richer, and more marrowy, than if it had been cured with common salt alone. Best common salt, two parts; saltpetre, one part; sugar, one part: beat them up together, so that they may be completely blended. To every pound, or sixteen ounces of butter, add one ounce of this composition. Mix it well in the mass, and close it up for use. Butter prepared in this manner, will keep good for three years, and cannot be distinguished from that recently salted. It should, however, be remarked, that butter, thus cured, does not taste well till it has stood a fortnight, or three weeks. In the opinion of Dr. ANDERSON, such butter would keep sweet during the longest voyages, if it were so stowed, that it could not melt by the heat of the climate, and occasion the salts to separate from it. Hence the butter ought to be previously freed from its mucilage, which is more putrescible than the oily parts. In order to prepare it for a distant voyage, let it be put into a vessel of a proper shape, which should be immersed into another, containing water. Let this be gradually heated, till the butter be thoroughly melted, in which state it may remain for some time, and then be allowed to settle. Thus, the mucilaginous part will fall entirely to the bottom, and the pure oil will swim uppermost, perfectly transparent, while hot; but, on cooling, it becomes opaque, assumes a colour somewhat paler than the original butter, before it was melted, and acquires a firmer consistence; by which it is better enabled to resist the heat of tropical climates.

When this refined butter is become somewhat firm, yet soft enough to be handled, the pure part should be separated from the dregs, then salted, and packed in the usual manner.

There is another, still more curious, way of preserving this refined butter, stated by Dr. ANDERSON. After it is purified, add to the butter a certain portion of firm honey, mix them well, and they will thoroughly incorporate: this mixture, when spread on bread, has a very pleasant taste, and may be given to aged persons, if they relish it, instead of marrow; and to others, as being useful for coughs and colds. The proportion of honey employed was considerable; and the Doctor remarks, that this mixture has been kept for years, without acquiring the least degree of rancidity; so that there can be do doubt that butter might thus be safely preserved during long voyages.

The food of cows very often affects the taste of butter. Thus, if wild-garlic, charloc, or May-weed, be found in a pasture ground, cows should not be suffered to feed there, before the first grass has been mown, when such pernicious plants will not again appear till the succeeding spring; but milch-cows must not partake of the hay made of those plants, as it will likewise communicate their pernicious influence.

Cows should never be suffered to drink water from stagnant pools, in which there are frogs, spawn, &c.; or from common sewers, or ponds that receive the drainings of stables—all which are exceedingly improper.

As *turnips* and *rape* impart a disagreeable taste to milk and butter, Mr. ARTHUR YOUNG directs the dairy-man to boil two ounces of saltpetre in a quart of water; to bottle the decoction; and, when cold, to put a large tea-cupful of the mixture into ten, or twelve quarts, of new milk, immediately after it comes from the cow. As the turnips become stronger, the proportion of nitre may be increased.—A shorter, and equally effectual method, is, to scald the pans, or trays, with boiling water, just before the milk is poured in, and it will answer the purpose intended.—But it is not generally known that the bad flavour, or rancidity of *turnip-butter*, arises solely from the green food, or the tops of that plant. By previously cutting these away, the evil is completely prevented. Lord EGREMONT has adopted this expedient: he fed from 25 to 30 cows, for the greatest part of the winter, with turnips, the tops of which were carefully separated: and the butter prepared from their milk was equal to the very best of the kind.

For removing, or rather preventing, the bitter taste of barley-straw butter, as well as the rancidity of *turnip-butter*, Mr. MARSHALL suggests the following simple, and rational means: Instead of putting the cream, immediately after it is skimmed off the milk, into the jar, or other retaining vessel, it is first poured upon *hot water*, and having stood till cool, it is again skimmed off the water.

According to experiments accurately made by Mr. JOSEPH WIMPEY, to determine the comparative value of butter and cheese, 105½ gallons of milk, properly disposed in pans for skimming off the cream, produced 36lb. of butter, and 60lb. of skimmed cheese. From a like quantity of milk were made 106lb. of raw-milk cheese, and 6lb. of whey-butter. After selling the cream-butter at 8½d. and the skimmed cheese at 2d. the pound, when the raw-milk cheese, two months old, was worth 3½d. the pound, and the whey-butter 7d., it appears that a small advantage of about three *per cent.* lies on the side of butter and skimmed cheese.

Many abuses are practised in the packing and salting of butter, to increase its bulk and weight, against which we have an express statute. Lumps of good butter are frequently laid, for a little depth, at the top, and with an inferior quality under it; sometimes the butter is set in rolls, touching only at top, and standing hollow at bottom. To prevent such deceptions, the factors at Uttoxeter, in Staffordshire, a market famous for good butter, employ a surveyor, who, in case of suspicion, tries the cask, or jar, with an iron instrument, made not unlike a cheese-taster, and which he thrusts in obliquely to the bottom.—But we understand, that the greatest frauds are committed with the Irish butter, imported in firkins. One of our sagacious correspondents has suggested to us the propriety of communicating the *marks*, which the butter-casks ought to have on them, to distinguish their real goodness, before they are exported from Ireland: such information might be a guide to private families, who purchase a whole, or half a firkin at a time. On particular inquiry, we could only learn from several eminent butter-men, that the name of Belfast, or some other town in the north of Ireland, is usually marked on the cask, with an additional cross, and either one or more incisions under it, according to the superior quality of the butter. We trust, however, that no person will be disposed to purchase so precarious an article, without previously examining the contents of the vessel.

Lasly, we cannot omit to animadvert upon the pernicious practice of keeping milk in *leaden vessels*, and salting butter in *stone jars*, which begins to prevail, from a mistaken idea of cleanliness. But, in the hands of a cleanly person, there surely can be nothing more wholesome than wooden dishes. We fully agree with Dr. ANDERSON, that vessels made either of solid lead, or badly glazed, are alike destructive to the human constitution; that we may doubtless attribute to this cause the frequency of paralytic complaints, which occur in all ranks of society; and that the well known effects of the poison of lead, are, bodily debility, palsy—death!

MILK-BUTTER is principally made in Cheshire; where, contrary to the usual practice in other parts of the kingdom, the whole of the milk is churned, without being skimmed; preparatory to which operation, in summer, immediately after milking, the meal is put to cool in earthen jars, till it becomes sufficiently coagulated, and has acquired a slight degree of acidity, sufficient to undergo the operation of churning. This is usually performed, during the summer, in the course of one or two days. In winter, in order to forward coagulation, the milk is placed near a fire; but, in summer, if it has not been sufficiently cooled, before it is added to the former meal, or, if it has been kept too close, and be not churned shortly after it has acquired the necessary degree of coagulation and acidity, a fermentation will ensue; in which case, the butter becomes rancid, and the milk does not yield that quantity, which it would, if it had been churned in proper time. This is also the case, when, in winter, the jars, or mugs, have been placed too near the fire, and the milk runs entirely to whey. No peculiar process attends the making of this kind of butter.

Whey-Butter is so called, from its being made of whey, which is either green or white. The former is taken from the curd, out of the cheese tub; the white whey is pressed out of the curd, by the hand or otherwise, after having been put into the cheese vat. This kind of butter is made as follows: Sometimes the white whey, or, as it is called in Cheshire, the *thrustings*, is set in cream mugs, to acquire a sufficient degree of coagulation, and acidity for churning, either by the warmth of the season, or of a room, in the same manner as above described, for making milk-butter. In other instances, the green and the white whey are boiled together, and turned by a little sour ale, or other acid, which produces *fleetings*. See scalding Whey. In this case, when the green whey is boiled alone, it is necessary to keep up such a fire as will make the whey as hot as possible, without boiling it; and, when it has acquired that degree of heat, the butyraceous particles, which it contains, will break and separate, and rise to the surface, which effect usually takes place in the space of an hour. Care should be taken to rub the boiler, if of iron, with butter, to prevent the whey from acquiring a rancid taste. In other respects, the process of making whey-butter differs little from that of milk-butter. But the former will keep only a few days, has a marbled appearance, and does not cut quite so firm, or clear, as butter made of cream. — One of our correspondents observes, that, in the year 1794, whey-butter was sold by contract, for the whole year, at 10d. per pound, and carried 20 miles to Manchester:—he further remarks, that the *fleetings* are "nice eating," with sugar, though some epicures add wine or brandy.

Butter-Milk is that part of the milk which remains after the butter is extracted.—Curds of butter-milk are made by pouring into it a quantity of hot new milk. The quality of butter-milk greatly depends on the manner of managing the process of churning. If it be obtained according to the Lancashire method, above-described, it becomes an excellent food for man, being both wholesome and pleasant; though it is, in many English counties, given to hogs.

Good butter-milk is refreshing and cooling: hence, it is often recommended in hectic fevers, for abating preternatural heat and flushings of the face. In spring, if drank freely, it is said to produce a favourable change on the fluids, when they are in a state of acrimony. And, though modern physicians smile at the idea of sweetening, or purifying the blood, yet the good effects of butter-milk, as well as sweet whey, in proper cases and constitutions, have too often been experienced, to admit of any doubt, in consequence of an unsettled theory.

BUTTER-BURR, the COMMON, or Colt's-foot, the *Tussilago Petasites*, L. is an indigenous plant, growing in moist meadows, pastures, and banks of rivers. Its leaves are the largest of any plant in Britain, and, in heavy rains, afford a shelter to poultry, and other small animals. Its flowers appear in April, before the leaves, as in most other vernal plants. The root, dug up in spring, abounds with a resinous, aromatic matter: it has a strong smell, and a bitterish, acrid taste.

In Germany, the leaves of the butter-burr are bruised, and mixed with chaff, or cut straw; in which state they are fondly eaten by cattle.

Formerly, the root of this plant was highly esteemed as a sudorific, and alexipharmic, for which purposes a dram of it was given for a dose; but, as it has been found to possess those virtues in no very eminent degree, it has again been neglected in the shops. The late Sir JOHN HILL, however, in his "*Virtues of British Herbs*," published in 1770, calls the common butter-burr an admirable medicine in fevers of the worst kind; as, when taken *early*, it prevents the mischiefs that often arise naturally in the disease; and oftener from the errors of physicians. Sir JOHN farther informs us, that, about the middle of the last century, when a disease of the putrid kind prevailed in England, the same fever raged also in Germany; and while the English died by bleedings, and by chemical medicines, the Germans lived by the use of the butter-burr. He also very seriously speaks of a heavier visitation, and if the greatest of all calamities should come, there are few things from which we might expect so great relief as this herb. The Greeks used it with the greatest success; and the very name of the plant among the Germans, is *pestilence-wort*.—We trust, however, there will be no necessity for putting Sir JOHN's assertion to the test of experience; as we should be apprehensive of the result.

BUTTER-CUP, BUTTER-FLOWER, or UPRIGHT MEADOW CROW-FOOT, the *Ranunculus acris*, L.; a very common weed, abounding in meadows and pastures: it has hairy leaves, and leaf-stalks; and bears yellow flowers in June and July.

Many continental farmers attribute the sudden death of cattle, which is often inexplicable, to their feeding on this plant; and therefore carefully extirpate it from fields and meadows. To ascertain this important point, we request our rural correspondents to communicate to us the result of their experience, which we propose to publish in a future *Appendix* to this Encyclopædia. — It is, however, certain, that the *seed-buds* of the butter-cup are extremely acrid, and may therefore be employed for vesicatories, instead of the Spanish fly; though its blossoms are eagerly visited by bees. Indeed, the whole plant is very acrid, and easily blisters the skin. Nevertheless, it is eaten by sheep and goats, but refused by cows, horses, and swine, let their pasture be ever so bare.

BUTTERFLY, or *Papilio*, in zoology, a well known insect, of which there are 273 species, principally distinguished by the colour of their wings.

The beauties of this elegant part of the creation, excite the admiration of every contemplative mind. Many persons, who conceive butterflies to be of a poisonous nature, are frequently under apprehension lest they should eat them with herbs and salads; but such alarm is groundless, as they are perfectly harmless, and equally eatable as snails and oysters.

Mr. EDWARDS, in his "*Natural History of Birds*," gives the following curious directions for taking the figure of these insects: Take butterflies, or field-moths, clip off the wings close to their bodies, and lay them on clean paper, in the form of the insect when flying; then have ready prepared gum-arabic, which has been some time dissolved in water, and is of a thick consistence; then pour a drop of ox-gall into a spoonful of this liquid, mix it well together, and spread a little of it on a piece of thin, white paper, wide enough to take both sides of the fly; when it begins to feel clammy, the paper is in proper order to take the down from its wings; lay the gummed side on the wings, and it will adhere so as to take them up; then double the paper, so as to have all the wings between it; lay it on a table, pressing it close with the fingers, or it may be rubbed gently with something hard and smooth; after which, on opening the paper, the wings will come forth transparent; the down of the upper and under sides, adhering to the gummed paper, forms an accurate likeness of both sides of the wings, in their natural shape and colour.

When the gummed papers have been opened, the bodies of the flies should be copied from the natural ones, upon stiff, and separate paper, painted in water colours, and fixed between the representations of the wings.

BUTTERWORT, or the *Pinguicula*, L.; a genus containing six species, of which the most remarkable is the *vulgaris*, or common butterwort, or Yorkshire sanicle, growing on bogs, or low, moist grounds, in England and Scotland. Its leaves are covered with soft, upright, pellucid prickles, secreting a glutinous liquor; the blossoms violet, purple, and reddish, with white lips, and an ash-coloured, woolly spot on the palate: its flowers appear in May and June. LINNÆUS informs us, that if the fresh gathered leaves of this plant be put into a strainer, through which the milk of the rein-deer is poured while warm, and set by for a day or two, to become acescent, it acquires such a degree of consistency and tenacity, that neither whey nor cream, separate. The inhabitants in the north of Sweden eat this coagulated milk, as a very grateful food. When the leaves have been once used, it is not necessary to have recourse to them again; for half a spoonful of the prepared milk, mixed with a fresh quantity of other milk, will always effect the purpose: but Mr. HAWES, who tried this experiment with cow's milk, did not succeed.

The juice of the leaves of common butterwort kills lice in men and brutes; and likewise cures chaps in cow's udders. Neither sheep, cows, horses, goats, nor swine, will feed upon the plant; though it is erroneously believed that it occasions the rot in sheep.

External applications of the root, are, according to BECHSTEIN, a good vulnerary; and, if credit be due to him, decoctions made of the whole plant, tend to restore the hair to a bald head.

BUXTON WATERS are those warm mineral springs which rise in a village of that name, in Derbyshire, and have long been celebrated for their medicinal properties. One of the earliest treatises on the virtues of this spring, was published in the year 1752, by Dr. JONES, of Derby: at which period Buxton appears to have been a place of great resort. SHORT, in his "*History of Mineral Waters*," mentions that several remains of Roman antiquities have been discovered near this spot: hence it is probable that the fountain was known to the ancients.

The springs issue from several small fissures, in a calcareous freestone. They are very numerous, and always afford a sufficient quantity of water to supply the various baths. The most ancient spring is called Saint Anne's Well, which is now inclosed in an elegant stone building. There are several others, that supply a number of beautiful baths, both public and private.

With respect to its sensible properties, the Buxton water cannot be distinguished from common spring water, when heated to the same temperature. It is clear and colourless, and does not become turbid on being exposed to the air; it leaves no sediment, nor does it form any incrustation on the pipes, or stones, through which it flows. Its temperature in the gentlemen's bath is invariably at 82°. During the cool of the morning and evening, a thin column of steam is perceptible over the surface of the bath; but, if this continues throughout the day, it is considered as an indication of approaching rain. The principal peculiarity in the appearance of this spring, is a large quantity of elastic vapour that rises, and forms bubbles, which pass through the water, and break as soon as they reach the surface. The air of these bubbles was ascertained by Dr. PEARSON, to consist of azotic gas, mixed with a small proportion of atmospheric air. By evaporation to dryness, he found that a gallon of the water contained only 15 grains of residuum, of which he estimated $1\frac{3}{4}$ grains to be muriat of soda, $2\frac{1}{2}$ sulphat of lime, and $10\frac{1}{2}$ carbonat of lime.

Buxton water is frequently employed both internally and externally; one of which methods often proves beneficial, when the other would be injurious; but, as a bath alone, its virtues may not be superior to those of common water.

As the temperature of 82°. is several degrees below that of the human body, a slight shock of cold is felt on the first immersion into the bath; but this is almost immediately succeeded by a pleasing glow over the whole system. It is, therefore, proper for very delicate and irritable habits.

The cases which derive most benefit from the external use of Buxton waters, are those in which a loss of action, and sometimes of sensation, affects particular limbs; in consequence of long-continued, or violent inflammation, or external injury. Hence, the chronic rheumatism, succeeding the acute, and where the inflammation has been seated in particular limbs, is often wonderfully relieved by this bath. The internal use of the water has been found to be of considerable service in symptoms of defective digestion, and derangement of the alimentary organs. A judicious use of this simple remedy will often relieve the heart-burn, flatulency, and sickness; it will increase the appetite, animate the spirits, and improve the health. At first, however, it sometimes occasions a diarrhœa, which is rather salutary than detrimental. It also affords great relief, when taken internally, in painful disorders of the bladder and kidneys; and has likewise been recommended in cases of the gout; but, when taken for these complaints, Dr. DENMAN advises the addition of some aromatic tincture.

As an external application in the gout, Buxton water is sometimes of service, though the bath itself is more likely to restore the functions of the parts afflicted with this disease. In all cases of active inflammation, the use of these waters should be carefully avoided, on account of their supposed heating properties. A full course consists of two glasses, each containing one-third of a pint, before breakfast; which quantity should be repeated between breakfast and dinner. It is seldom administered as a medicine in the evening; but, as the inhabitants of the place use it for their common drink, and also for most of their domestic and culinary purposes, the invalid is apt to take a much greater quantity than is prescribed, and thus to defeat the purpose. In chronic cases, a long residence on the spot is requisite, to ensure the desired effect.

In the year 1773, a treatise on the virtues of these waters was written by Dr. T. PERCIVAL, of Manchester; since which period several pamphlets have appeared on the subject: among these we shall mention only those of Dr. DENMAN, Dr. HIGGINS, and Dr. PEARSON.

BUZZARD, or the *Buteo*, a species of the *Falco*, or eagle, is the most common of the hawk-kind in England. It breeds in large woods, and lays two or three eggs, which are either perfectly white, or spotted with yellow. This bird is of a sluggish and inactive disposition, as it will remain perched upon the same bough for many hours, and is generally found in one place. It feeds on small birds, rabbits, moles, and mice; but it will also eat frogs, worms, and insects. The colour of the buzzard is various: the breast and belly of some are brown, but more frequently the former is of a yellowish white, with oblong rust-coloured spots: the back of the head, neck, and coverts of the wings, are of a deep brown, edged with a pale, rust colour; the tail is barred either with black, or ash colour.

There is another species, the *æruginosus*, or moor-buzzard, with a greyish body, and yellow legs. It makes its nest in a tuft of grass, or among rushes, is a fierce and voracious bird, and a great destroyer of rabbits, young ducks, and other water-fowl.

C.

CABBAGE, or *Brassica*, L. a genus of plants comprising sixteen species, of which the following are the principal:

1. The *orientalis*, or perfoliate cabbage. This species is indigenous, grows in corn-fields, and cliffs on the sea-coast near Harwich, and Bardsey near Orford, Suffolk; but it is not cultivated.

2. The *campestris*, or field-cabbage, which is also a native, and grows on the sea-shore near Dover. The severest winters do not injure this plant, which becomes peculiarly useful when every other species is destroyed. It is more generally known under the name of cauliflower, and its culture has been much improved in Britain, where it has become a source of national wealth; the greater part of Europe being supplied thence with seeds, and, till lately, Holland almost wholly with plants.

3. The *Napus*, or rape, or coleseed cabbage, which is indigenous, and also reared in various parts of England, especially in the Isle of Ely, for its seed, from which rape-oil is extracted; the refuse is called oil-cake, and is useful for the fattening of oxen, and other cattle. The most piercing frost affects not this hardy plant, which, in severe winters, is of no small service in feeding ewes; when, from the intenseness of the cold, the ground is so frozen that no turnips can be taken up. In the county of Norfolk, the cakes are broken to pieces and strewed on the land as manure, for which purpose it is considered particularly efficacious. The cultivated variety, though it has a stronger taste, may be eaten like the turnip.

4. The *rapa*, or turnip-cabbage. This is a native of Britain, and grows principally in corn-fields: it is eaten either boiled, roasted, or raw, generally with the addition of pepper. The importance and value of this species, for the fattening of cattle in particular, have not been generally known or ascertained till within these few years. The soil intended for planting, ought to be manured and tilled in the same manner as for the common turnip, the necessary extent of old pasture-ground being previously breast-ploughed and burnt. The land should be dug as shallow as possible, and the ashes turned in: about Midsummer, or sooner, should the weather be favourable, the planting ought to be commenced; two perches, if well stocked with plants, being sufficient to supply an acre.

Independently of the utility of this plant, as a fodder for cattle during the winter season, it has been much recommended as a sea-store, from the facility with which it may be preserved on ship-board; and as it furnishes an agreeable and wholesome food for sailors on long voyages, at a time when every other fresh vegetable is entirely spoiled.

5. The *Oleracea*, or sea-colewort, sea-cabbage, or common cabbage, is also indigenous, and grows principally on cliffs near the sea-coast.

Early in the spring, this species is preferred to those that are cultivated; but, when gathered on the sea-coast, it is requisite that it be boiled in two waters, to deprive it of its saline taste. The roots may be eaten like those of the preceding species; but they are by no means so tender. All the various kinds of garden-cabbage in use at our tables, originate from this. The red cabbage is chiefly used for pickling. In some countries, the white cabbage is buried in autumn, when full grown, and is thus preserved during the whole winter.—See WITHERING, p. 592. They are cut in pieces by the Germans, who, mixing them with some aromatic herbs and salt, press them closely down in a tub, where they soon ferment, and are eaten under the name of *sauer kraut*.

Dr. DARWIN observes, that *Sea-Cale* is much esteemed for the delicacy of its taste, which is superior to most kinds of broccoli. It appears that this species of the cabbage should be sown the latter end of March, or the beginning of April, in drills, and afterwards earthed up. In autumn, it should be transplanted into high beds, one row of roots in each bed, about a foot asunder; and, in winter, it should be covered up. The beds should be made in dry ground, and the produce will not be fit for the table till the third year after sowing. The year before it is cut for eating, it must be covered in the beginning of winter, first with stable-dung, which may be prevented from pressing on it, by placing a few sticks in the form of a cone over each root; it should then be covered with long litter, to the height of two or three feet. About the beginning of January it may be gathered, and the cutting continued till May, one bed being kept under another. It should be boiled, and sent up on toast, like asparagus.

To this species also belong those varieties of the *brassica*, denominated the *turnip-rooted* cabbage, and the *drum-headed* cabbage. The former is generally supposed to have been brought from Lapland, and is found to be well calculated for uplands and wolds. It delights in a dry, sandy, mixed soil, which is prepared in the same manner as for turnips. The seed is usually sown in the beginning of June, and yields so abundantly, that half a pound of it, if sown on a seed-bed two or three perches square, will produce plants sufficient to stock an acre. But if they run too much to stalk, care must be taken to transplant them, and thus to check their luxuriant vegetation. This plant is very hardy, and its bushy tops furnish a most excellent and abundant food for cattle during the spring. It is principally raised for feeding oxen, cows, hogs, and horses; but, if given to sheep during winter, it occasions a species of white flux, of which, however, they soon recover on a change of food; and which is seldom, if ever, attended with any dangerous consequences.

The drum-headed cabbage is usually sown on a bed towards the end of February or March; but sometimes also in August, in which case the plants are set out in November, and transplanted in July. A hardy variety, of a deep green colour with purple veins, and of the same size as the drum-head, has been produced from this cabbage, by planting it alternately with the red kind; and, when the pods were completely formed, by cutting down the red and leaving the other for seed. This variety is particularly useful in the feeding of cows or ewes; as it affords an increase of milk, far superior to that produced by turnips: and is equally excellent for the fattening of cattle, which it does six weeks sooner than any other vegetables. Although these plants are generally supposed to impart a disagreeable flavour to butter and cheese made from the milk of cows fed upon them, yet this may be easily prevented, either by putting one gallon of boiling water to six gallons of milk, when it is exposed in the *leads*; or by dissolving one ounce of nitre in a quart of spring-water, and mixing about a quarter of a pint of it with ten or twelve gallons of milk, when warm from the cow. By breaking off the loose leaves, and giving only the sound heart to the cows, this disagreeable quality may also be obviated; as other cattle will eat the leaves without injury.

6. The *muralis*, or wall-cabbage, which is usually found on old walls and rubbish. This plant is a native of Britain; all its parts are considerably acrid, and have a rank, disagreeable smell: it is, therefore, never cultivated.

7. The *Alpina*, or Savoy. This is an exotic, and is chiefly propagated for winter use; being generally preferred when nipped by the frost. It is sown towards the latter end of April, and the culture of it varies but little from that pursued with respect to the common white cabbage; the only difference being, that the latter species may be set more closely together than the former; for, if planted in close places, it is subject to be almost consumed by caterpillars or other vermin.

8. The *Monensis*, or Isle-of-Man Cabbage, which grows in a sandy soil, on sea shores, particularly in the north-western parts of Britain. This plant differs little from the *Brassica muralis*, as it appears to correspond exactly with some specimens in the possession of Dr. WITHERING. Like the latter, it is not cultivated.

To these species may be added the Scotch cabbage, so denominated from being more particularly cultivated in Scotland, where it constitutes a very considerable article of food for cattle. The variety introduced into England a few years since, is the green Scotch cabbage, which will grow extremely well on moor-lands, and, if cut just before the frost sets in, and hung up under cover, forms a food so peculiarly agreeable to cattle, that, when once they have tasted it, they will rarely relish any other.

There is another species of the *Brassica*, denominated the mowing cabbage *(choux à foucher)*. It appears to be a native of Germany, but has been cultivated with considerable success in France, both as a pulse for mankind, being free from the bitter herbaceous taste of the other cabbages, and as a fodder, equally good and abundant for cattle. This plant is reared from seed, and will admit of being cut four, five, or six times in the year it is sown; after which it is left for the winter. In the month of February it shoots forth, when its leaves may be cut again; in April it begins to grow up, and produces stalks and seed, which may be gathered in June. During the first year of its growth, this plant does not send forth any stalks; its leaves appearing to rise immediately out of the ground, from which circumstance it may be cut like grass, and dried in a similar manner for hay. It will also yield oil, far superior to that of cole and poppy seed, and equal to that expressed from olives.

Culture. The different modes of cultivating this plant do not, in general, vary much. The soil best calculated for cauliflowers, is a spot of ground tolerably rich, and well defended from the north, east, and west winds, by hedges, pales or walls, the first of which, especially if constructed with reeds, are most preferable, as they meet the wind, which, by falling on them, cannot reverberate, as is the case with the latter. But, should the soil selected for this purpose, be naturally wet, it will be requisite to raise it up in beds two feet and a half, or three feet broad, and about four inches above the level of the ground. On the contrary, if it be dry, no embankment is necessary.

With respect to the other species of cabbage, with a few exceptions, they delight in situations rich, open, and dry, yet not too much exposed to the inclemencies of our variable climate; care being taken at the same time not to plant them too near, especially when intended for seed; as, independently of their mutually obstructing the growth of their roots, by the commixture of their effluvia, they will produce a mixture of kinds. This is particularly the case with respect to the planting of white and red cabbages together, and of Savoys with either of those species. In fact, it is to this cause we owe the continual importation of fresh seeds from abroad, our gardeners rarely saving any good red cabbage-seed; whereas, if a contrary conduct were pursued, they might continue the species as good in Britain as in any other part of the world.

In whatever light we view this plant, whether as an article of food for man, or as fodder for cattle, it fully merits all the attention, which of late years has been bestowed upon it. It amply repays the care and diligence which the industrious cultivator confers on it, each species being equally fruitful. And it is a fact, though not generally known, but which deserves greater publicity, that when the common garden cabbage is in perfection, and we wish to cut it, if, instead of severing the whole from the stalk, as is usually done, the loaf, or heart only be scooped out, and all the large lower leaves left entire, a young cabbage will, in due time, be produced, superior in flavour, if not equal in size, to that of the first growth.

Upon the whole, from a comparative estimate, and from the concurrent testimony of the most experienced cultivators, it appears that the success of cabbages depends much on their being planted in a rich soil; for, as this plant is extremely vigorous, its roots strike deeply into the ground, so that it is well calculated for improving the fertility of the soil: it demonstrates the advantage of manuring and fallowing, as also the very great profit of applying the best land of a farm to its culture.

From the earliest stage of its growth, the cabbage becomes the prey of a variety of insects, none of which is more formidable than the caterpillar. When young, its principal enemy is the *Chrysomela saltatoria*, or turnip-fly, and as it approaches nearer to maturity, the *Papilio Brassica*, or cabbage-butterfly.

terfly. To expel the former, Dr. WITHERING directs the ground to be strewed with soot. He also adds, that if the plants be whipped with the green boughs of alder, the latter will not touch them. With respect to caterpillars, it has been recommended as a certain remedy for the mischief they cause, that all the borders of the ground, where it is intended to plant cabbages, be sown with hemp; and, however the vicinity may be infested with those insects, the ground inclosed will be found to be perfectly free from them; no vermin will approach it. There is also another remedy prescribed, which, though somewhat more complex than that above-mentioned, has nevertheless been of considerable efficacy in exterminating those insects from cabbage plantations: For an acre of ground, two ounces of common asafœtida are directed to be taken and boiled in a small pot of dung-juice, till the whole is dissolved. This decoction is to be emptied into a shallow tub, with the addition of a pint or two of dung-liquor; and the whole, being well stirred with a stick, carried into the field for use. All the plants, previously to being set, are to be steeped in this decoction in the following manner: As many as can be clasped in both hands should be immersed in this composition, so as to moisten thoroughly every part of the plants; which, as soon as this operation is performed, are to be placed in heaps on the ground, and sprinkled with a little mould. Thus moistened, they are to be distributed to the planter, who must immediately set them in holes previously prepared, and, with a piece of wood for that purpose, press the earth against each plant. Such is the effect of this operation, that no game will touch these plants, but, on the contrary, will avoid them with the utmost abhorrence and precipitation. It must be observed at the same time, that no apprehension whatever need be entertained, lest the plant should contract any bad or unwholesome scent from this preparation, as the united effect of the sun and air will purify it in the course of time. The same intelligent correspondent, in the Gentleman's Magazine for 1763, mentions also another remedy, somewhat more simple in its composition, which, when sprinkled on the plants that are infected by insects, will soon destroy them, or compel them to retreat. He directs six dwts. of asafœtida, three of woad, a similar quantity of garlick, and bruised laurel-berries, to be infused in a pailful of dung-water. To this are to be added one handful of the leaves or tops of alder, and another of carline, white cameleon, or thistle-root. The whole of this is to digest for three days, and as many nights; and, when there is occasion to use it, on sprinkling the infected plants with a wisp of rye-straw, it will eradicate those noxious insects.

Qualities. Every species of cabbage is generally considered as being hard, affording but little nourishment, and as tending to produce flatulency; but this supposition does not appear to be well founded. Different vegetables have, we know, different effects on various constitutions; and to this cause may be attributed the opinion, generally received, respecting the unwholesomeness of cabbages. They have a strong tendency to putrefaction, especially when frost-bitten; they become putrid much sooner than any other vegetable, and, when in that state, their smell is extremely offensive, and bears no small resemblance to that of animal substances in a state of putrescency. The cauliflower is considered as the easiest to be digested, of all the various species of cabbage. But, notwithstanding these apparent obstacles to the use of this plant, it is not destitute of utility in a medicinal way; a decoction of red cabbage being frequently recommended for softening acrimonious humours in some disorders of the breast, and also in hoarseness.

CABBAGE, the ANJOU, is a shrub, a native of France, in the western provinces of which, and also in Glamorganshire, and other parts of Wales, it is successfully cultivated. It is leguminous, and equally useful both for food and fodder. Its stalk, which generally grows to the height of seven feet, when dried, makes excellent fuel. The following circumstances more particularly recommend the culture of this plant: 1. That it will grow on the most indifferent soil; 2. That it will endure the severest winter, and produce a constant succession of sprouts during the spring; and, 3. That it will yield an abundance of seed, though the young shoots be ever so frequently gathered. Lastly, it never causes any flatulence or uneasiness in the stomach, and is so tender that a minute's boiling is sufficient for dressing it. Cattle likewise eat it eagerly, and especially cows, whose milk it considerably increases.

CABBAGE-PALM, or *Areca oleracea*, L. an exotic plant, and, perhaps, the tallest, and most beautiful of vegetable productions, growing generally to the height of 170 or 200 feet. It is about seven feet in circumference near the ground; its branches, when full grown, are 20 feet in length, and have a great number of green pennated leaves, some of which are nearly three feet long, though only an inch and a half broad. The bark of the cabbage-palm, which tapers as it ascends, is distinguished for a peculiarity, that is not to be observed in any other tree. Till it reaches within twenty-five, or thirty feet of the extremity, it is of an ash-colour, but then immediately changes to a deep sea-green, and continues so to the top, near which, what is called the *cabbage*, is found enveloped in several thin, snow-white brittle flakes, of a taste similar to almonds, though somewhat sweeter. The *cabbage-flower* first appears like a small husky *spatha*, or sheath, and grows to the length of twenty inches, and to the breadth of about four inches. On being opened when young, a farinaceous yellow seed in embryo, resembling saw-dust, is found abundantly dispersed among its filaments, which are pickled and eaten with great relish. But, if it be permitted to arrive at maturity, it bursts, and the inclosed part produces several small oval nuts, resembling coffee berries.

The other parts of this plant are employed for various purposes, one of which deserves particularly to be noticed. On the inner side of the young foot-stalks are tender pellicles, of which, it is asserted, good paper might be manufactured. When the materials for making that article are so scarce, this substance deserves at least a fair trial, as it grows abundantly in the West Indies, and might be thence procured without much difficulty.

CAGE, an inclosure of wire, wicker, &c. interwoven in the form of lattices, and used for the confinement of birds, or beasts. The latter were, in ancient times, brought to Rome in cages artfully formed of oak, or beech, and covered with boughs, that the creatures, deceived by the appearance of their place of confinement, might fancy themselves in a forest. In France, there are two sorts of cages, viz. high, or singing cages, and low, or dumb cages: those who expose birds to sale, are obliged to put the cocks in the former, and the hens in the latter, that persons may not be deceived by purchasing a hen for a cock.

CAJEPUT, an oil brought from the East Indies, and resembling that of cardamoms. Its uses are so little known in this country, that it is rarely kept, even in the shops of the metropolis. According to Prof. THUNBERG, the celebrated Swedish traveller, it possesses preeminent virtues as an anodyne, antispasmodic, and stimulant. In chronic inflammations of the eyes, great benefit has been derived by pouring a few drops of it upon a soft, white, linen cloth, and letting them evaporate while held close to these organs, over which the cloth is to be afterwards tied for the night.

In acute rheumatism, and the gout, this ethereal oil has been known to afford immediate relief, when the affected part has been anointed with it, as it has a remarkable tendency to open the pores: it is also highly beneficial in violent head-achs, when applied to the temples, or inhaled through the nostrils. But its most remarkable effect is in that painful complaint, the tooth-ach. From whatever cause this affection may proceed, whether from a carious, or hollow tooth, rheumatic acrimony, catarrh, &c. the cajeput oil has generally been found efficacious in removing it, if dropped on lint, and placed in the cavity of the tooth, or even around the gum. Hence it deserves to have a place in the medicine-chest of every private family. In acute rheumatisms, however, we would observe, that it ought to be administered with circumspection; but, when applied in painful chronic disorders, or paralytic complaints, its use may be attended with salutary consequences.—Perhaps the only shop in London where this oil is vended tolerably pure, as imported from the East, is that of Messrs. COXWELL and BROMET, Fleet-street, near Temple-bar.

CAKE, a fine sort of bread, which has received this denomination, on account of its flat and round figure.

There are various compositions under the name of cakes; as seed-cakes made of flour, butter, cream, sugar, coriander, and carraway seeds, mace, and other spices; plum-cakes, cheese-cakes, sugar-cakes, &c. which are so well known as to render any description of them unnecessary. *Oat-cakes*, which are made in most parts of the country, but particularly in Yorkshire, and in Scotland, consist of fine oaten flour, either with or without yeast, rolled thin, and baked in a warm oven, or over a slow fire. *Rose-cakes*, are the leaves of roses dried and pressed into a mass, and sold in the shops for epithems.

CALAMINE, or Calamy, *Lapis calaminaris*, or *Cadmia fossilis*, a species of stone, or mineral, which contains zinc, iron, and some other

sub-

substances. It is of various colours, somewhat hard and brittle, and of conſiderable weight; its magnitude is generally considered as a proof of its excellence. It is found principally in Derbyshire, Nottinghamshire, the western parts of England, and also in Wales. This mineral constitutes an article of the *Materia Medica*; but, previously to being used, it is generally roasted, or calcined, in order to separate the sulphureous matter it is supposed to contain in its crude state; and also to render it more easily reducible into a fine powder. Thus prepared, it is employed in collyria, against defluxion of thin acrid humors from the eyes; for drying up humid, running ulcers, and for healing excoriations.

CALAMINT, or the *Melissa Calamintha*, L. an indigenous species of the balm. Its botanical characters are: the foot-stalks axillary, forked, and generally shorter than the leaves; fibrous, perennial roots; upright, square, hairy, stalks, raising about a foot high; roundish, indented, opposite leaves, and verticillate clusters of small, blueish flowers. It grows on the sides of roads and corn-fields, and is easily propagated by offsets.

The calamint, as well as the other species of the melissa, is now only ranked in medical practice among the mild corroborants. Infusions of the leaves in water have an agreeable smell, but a weak taste; yet, when inspissated, they leave a considerable quantity of a bitterish extract. See BALM.

Calamus. See Sweet FLAG.

CALANDRE, an insect of the *Scarabæus*, or beetle class, thus denominated by some French writers, and which is particularly destructive in granaries. It has two antennæ, or horns, consisting of several round joints, covered with a soft, short down. From the anterior part of its head projects a proboscis, or trunk, the end of which is so formed, as to facilitate the insect in penetrating the coat, or skin that covers the grain, and to enable it to reach the meal, or *farina*, which supports it, and in which the female deposits her eggs.

The female lays an immense number of eggs, but seldom leaves more than two in one grain; these eggs, in the course of time, produce small worms, the bodies of which are generally found rolled up in a spiral form. When, during their residence in the grain, they have attained their full growth, they are changed into chrysalis, and, after the lapse of a fortnight, into perfect calandres. So prolific are these insects, that their increase would be alarming, were they not destroyed, while in the egg-state, by a species of mites which abound particularly in granaries, and devour by far the greater part of these larvæ.

CALCAREOUS MATTER, consists of various kinds, which have their respective uses and value in agriculture. Lime-stone and marble are both calcareous substances, but the latter is in a crystalized state.

It is clearly ascertained, says Dr. DARWIN, that calcareous earth, either alone, or in some of the states of chemical combination, may contribute to the nourishment both of animals and vegetables: first, because it constitutes a considerable part of them, and must therefore either be received from without, or formed by them; and, secondly, because from the analogy of all organic life, whatever has composed a part of a vegetable, or animal, may again, after its chemical solution, become a part of another vegetable, or animal; such is the general transmigration of matter.

Unburnt calcareous earth is said to forward the putrefaction of animal and vegetable substances; while pure lime, though it apparently prevents putrefaction, destroys, or dissolves, the texture of the flesh. If lime be mixed with oak-bark, after the tanner has extracted its soluble parts in water, the bark will, in two or three months, be reduced to a fine black earth; but, if it were only laid in heaps, as many years would be required to effect its spontaneous fermentation, or putrefaction. See LIME.

Von CRELL, a celebrated German chemist, a short time since made experiments, in order to ascertain the comparative effects of alum, magnesia, and calcareous earth, in the dying of cloths with madder; by which it appeared that no advantage was derived from the two last mentioned substances, as alum, and its solutions, produce finer colours, and may always be employed in preference to the others.

CALCINATION is the reduction of solid bodies by fire, to a state of powder, or ashes: a process which is attended with a change of their quality, and is essentially different from comminution, or mechanical trituration.

Having, under the article ASHES, treated of the burning of vegetable and animal matters, we shall confine our account, in this place, to metals.

To calcine such metals as melt before ignition, they must be kept in fusion for some time; nor will this operation succeed, without a free admission of air: the surface of the metal must therefore be kept clear of the calx. Should any part be excluded from the air, no such change of quality will take place: and if any coal, or unctuous, inflammable matter, be suffered to fall into the vessel, it would reduce even the quantity, already calcined, to its former metallic state. The continuance of fusion causes the increase of the particles of fire; which, as they penetrate every pore, decompose the whole so completely, that the fluidity can no longer subsist. The body is thus left porous, extremely brittle, and easily reducible to the finest powder. This accounts for the parts of the body calcined being much broken and rarefied, and specifically lighter than in their original state.

The calcination of metals, gold, silver, and mercury excepted, is much promoted by nitre: the process of which is usually termed *deflagration*, or *detonation*.

Fusion with any vegetable, or animal inflammable matter, will restore all *calces* and *scoriæ* to their natural metallic state. They are, however, more difficult of fusion than the metals themselves, and scarcely any but those of antimony, lead, or bismuth, can be melted, without some additional flux, consisting chiefly of alkaline salt, in the strongest fire that can be furnished by the common furnaces. The *reducing flux*, which is a mixture of alkaline salt with inflammable matter, brings the calx into fusion, and revives it into metal. The common preparation of such a mixture, consists of two parts of water, and one part of nitre, well ground together, then set on fire, and covering the deflagrating powder, with some vessel,

sel, till it be changed into a black alkaline, coaly mass. This is called, by chemists, the *black* flux, a double quantity of which, in proportion to the calces, or scoriæ, exposed to a proper heat in a crucible, closely covered, will make them melt, and resume their metallic form.

CALCULARY of a Pear, is a cluster of small, strong knots, which are dispersed through the whole of the *parenchyma* of the fruit. It is mostly found in rough-tasted, or choke-pears, of which it does not form any essential part; as the several knots which compose it, are only so many concretions, or precipitations out of the sap, in a manner similar to that seen in urine, wine, and other liquors.

Calculus. See STONE.

Calendar. See KALENDAR.

CALENDER, a machine employed in manufactories to press woollen and silken stuffs, and linens, in order to make them smooth, even, and glossy, and also to give them waves, as is done with mohairs and tabbies. This apparatus consists of two thick cylinders or rollers of very hard and well-polished wood, round which the stuffs intended to be calendered, are wound. The rollers are then placed cross-wise between two very thick boards, the lower of which serves as a fixed base, while the upper one is moveable by means of a thick screw, with a rope fastened to a spindle that forms its axis: the uppermost board is also laden with large stones of above twenty thousand pounds weight.

CALF, in zoology, the young of a cow. On account of its great utility, the means of rearing, feeding and improving this animal, have from its earliest existence, exercised all the ingenuity of mankind. There are two methods of feeding calves: the first is, to let them run about with their dam the whole of the first year; a plan which is generally acknowledged to be productive of the best cattle, and is pursued in counties where fodder is cheap. The other mode is, to take them from the dam when about a fortnight old, from which period they are "brought up by hand."

Various plans have, with considerable success, been tried and recommended for the rearing of calves, with a small allowance of milk, and in some cases without any. In several counties of England, calves, on being taken from the cows, are taught to drink luke-warm *flet*, or skimmed milk; it being dangerous to give it them too hot. The time selected for this purpose, is from the latter end of January to the beginning of May, about twelve weeks after which, for nearly a month, they are fed with milk diluted with water. Small wisps of hay are then placed round them on cleft sticks, in order to induce them to eat. About the latter end of May, they are turned out to grass, being only taken in a few times at first, during the night, when they have milk and water given them; which is also continued, though in less proportion, during the last month, till they are able to feed themselves, and consequently disregard it. Care is also taken to wean them with short and sweet grass; for, if hay and water be used, they become liable to swellings and the rot.

In other parts of England, a composition called linseed-milk is found to be of considerable utility for this purpose. The principal ingredients of which are, a small quantity of linseed-oil-cake finely pulverized, which may be increased as occasion may require, in proportion as the calf becomes accustomed to it, and gradually mixed with some skimmed milk, sweetened with treacle. This must be made nearly as warm as new milk, when first taken from the cow. An infusion of hay, called indiscriminately hay-tea, or hay-water, mixed with linseed, and boiled down to the consistence of a jelly, has likewise been tried with success; as also a species of water-gruel, consisting of nearly one-third barley, and the remainder of oats, ground very fine. A similar composition is used in the county of Cornwall; the only difference being the addition of scalded or skimmed milk. These are some of the principal modes adopted for the rearing and weaning of calves; from which, in general, the rest differ but little.

The fattening of calves, from the esteem in which their flesh is held, is an object of importance, especially in the vicinity of London, where the lands are not so profitable for breeding cattle, as in other parts of the country; and the methods used for that purpose are as various as those for rearing them. Since the improvements which have taken place in rural economy, calves have a much greater variety of food than before. Grains, potatoes, malt-dust, pollard, and turnips, together with sweet hay, now constitute their common aliment. But, in order to make them fine and fat, the best and most efficacious way is, to keep them as clean as possible, by elevating the coops in such a manner that the sun may not have too great power over them, and to such a height above the level of the ground, that their urine may pass off; by giving them fresh litter every day, and suspending over the coop a large chalk-stone, so that they can easily lick it. Besides this, it is usual to bleed them when they are about a month old, and again just before they are slaughtered; which practice contributes in a considerable degree to the beauty and whiteness of the flesh, and is therefore more frequently repeated by some persons; but this is not altogether necessary; twice bleeding being fully sufficient for that purpose, in the opinion of the most experienced breeders. It is, however, to be observed, that those calves which are intended for bulls, or to be gelt for oxen, should be selected as soon as possible; as for the latter operation they should not be older than twenty days.

Distempers. From the first day of their birth, calves are subject to various distempers, which require great attention. The earliest is that generally called the *scouring*, for which an ingenious correspondent in the *Annals of Agriculture* (vol. xix. p. 437) prescribes a mixture of powdered chalk and wheat-meal wrought into a ball with gin, as a medicine that may be given with safety. They are also liable to be hoven, in which case the thrusting of a penknife through that part of the swelling which rises highest near the hip-bone, and introducing a large quill into the orifice, have been attended with success in relieving them. The *shoote* is another distemper which is particularly fatal to calves, and attacks them a few days after their birth.

The symptoms generally are, 1. A colic more or less violent, which is often very severe and dangerous, especially when it is infectious.—This antecedent colic is terminated, and the animal relieved, by a discharge taking place from the bowels; but this is sometimes fatal before the *shoote* appears. 2. A loathing, and refusing of food, even previous to the evacuation, which increases and decreases in proportion to the violence and duration of the distemper. In this disorder, the cheapest, and perhaps the best medicine which has generally been administered by several experienced breeders, is milk well mulled with eggs; or eggs and flour properly mixed with oil, melted butter, and mucilaginous roots, or seeds, such as linseed, aniseed, &c. But the most fatal of the various diseases to which calves are subject, is that denominated in Herefordshire, the *gut-tie*, where it most commonly prevails; the symptoms of which are, a total stoppage in the bowels, except a copious discharge of blood and mucus, accompanied by a violent fever, that occasions the affected animal to kick at its belly, lie down, and groan. This is the effect of an erroneous method of castration, which causes a stoppage in the bowels, and brings on mortification, and which in a few days proves fatal. The only safe mode of cure is, to make a perpendicular incision four inches under the third vertebra of the loins over the paunch, or stomach, and introduce the arm to find the part affected, the beast being kept, if possible, in an erect position, by the help of proper assistants. In order to remove the stoppage in the stomach occasioned by the *tie*, and to carry off the fever, four ounces of Glauber's salts, two ounces of cream of tartar, and one ounce of senna, infused in two pints of boiling water, are given, to which are added half a pound of olive oil; the whole of this is worked off with gruel in which mallows and alder-bark have been infused. In order to avoid any farther detail of this and the preceding distempers, we must refer our readers to the third volume of Mr. YOUNG's *Annals of Agriculture*, p. 200—216; and to the second volume, p. 98—104, of the *Repertory of Arts and Manufactures*.

Calf's Snout. See Lesser SNAPDRAGON.

CALICO, a stuff or cloth of cotton, originally manufactured in India; but, within the last twenty or thirty years, it has been imitated in Britain, and brought to great perfection, since the invention of machines for spinning cotton. In the towns of Manchester, Glasgow, Paisley, &c. many thousands of industrious hands are employed in the manufacture of this article; which, according to its different degrees of fineness, is sold from 6d. to 6s. and upwards, a yard.

Cotton cloth is an intermediate substance between that made of flax and animal wool; but by no means deserves to be commended as a substitute for flannel, next the skin. Calico imbibes and retains the perspired humors, unless it be as frequently changed as linen; while flannel admits a free evaporation through its more numerous pores.

CALKINS are the prominent parts at the extremity of a horse-shoe, bent downwards, and the edges blunted. They often occasion horses to trip, and sometimes also produce the *bleyme*, or an inflammation in the foot between the sole and the bone; while the disease is communicated to the back and the sinews.

Calkins, when formed like a hare's ear, and if the horn of a horse's heel be pared pretty low, seldom do much damage; but when left large and square, they spoil the foot entirely. There are single and double calkins, accordingly as they are made at one or both ends of the foot: the latter, however, are but rarely hurtful, and generally make a horse trot more even and steady.

Caltha. See Marsh Marygold.

Caltrops. See Pondweed.

CALX properly signifies lime; but the term is also used by chemists and physicians for a fine powder, which remains after the calcination of metals and other mineral substances. All metallic calces are found to weigh more than the metal from which they were originally produced.—See Calcination.

CAMBLET, or Chamblet, a stuff made of wool, silk, and sometimes of hair, especially that of goats, combined with the first-mentioned substances. In some, the warp consists of wool and silk, and the woof of hair. The real oriental camblet is made from the hair of the Angora goat. There are no camblets made in Europe of goat's hair alone: France, Holland, Flanders, and England, are the chief places where this manufacture is carried on. Those of Brussels are allowed to be of the finest quality, and those of England stand next in repute.

These articles are of various kinds, which are denominated *figured* camblets, *watered* camblets, *waved* camblets, &c.

CAMBRIC, in commerce, a species of very fine white linen, made of flax, which derives its name from Cambray, a city of France, where it was first invented. This article has long been an object of considerable advantage to the French, who formerly drew large sums annually from England by its sale: hence the British Parliament was induced to pass several laws to prevent this loss of our national wealth; and, among others, the 18 Geo. II. c. 36, and 21 Geo. II. c. 26, which impose a penalty of 5l. on all who are convicted of wearing, selling, or making up for hire, any cambric or French lawns; which, however, are allowed to be exported.—A cambric manufactory was established some years since at Winchelsea, in Sussex, to regulate which the statutes of the 32 Geo. II. c. 32, and 4 Geo. III. c. 37, were passed; but it was very soon relinquished, and the manufacture carried into Scotland and Ireland, whence we are now supplied with that article.

Camline. See Gold of Pleasure.

Cammock. See Thorny Rest-harrow.

Camomile. See Chamomile.

Campeachy Wood. See Logwood.

CAMPHOR, a white, solid, transparent resin, of a very volatile penetrating smell, and a bitterish aromatic pungent taste, accompanied with a sense of coolness. It is chiefly extracted from the wood and roots of the *Laurus Camphora*, L. a tree growing in Sumatra and Japan; but may also be obtained in small quantities, by distillation, from a variety of vegetables, such as the peppermint, cardamoms, &c. in which it may easily be discovered by their peculiar camphorated odour, and their cooling pungent taste. From these, the camphor may be disengaged by distillation, either in a pure state, or in combination with essential oils. In order to separate it, dissolve the whole of the camphorated oil thus obtained in a proportionate quantity of alcohol; then dilute this solution with twelve times the quantity of distilled water: if the oil contain no camphor, the water used for the mixture will remain clear and transparent; the alcohol will gradually combine with it, and the oily particles separate. On the contrary, if the oil be mixed with camphor, the whole mixture will be converted into a milky liquor, from which the camphor will be gradually precipitated in the form of a white powder, while the oily parts ascend to the surface of the water. By melting this powder in a close glass vessel, over a moderate fire, it will assume the concrete form of camphor; though the remaining liquid will retain a small portion of this substance, as well as of essential oil.

Camphor is justly esteemed one of the most efficacious medicines for promoting perspiration, relieving spasms, and resisting putrefaction: hence it has long been celebrated in malignant fevers, and epidemical distempers. In delirium, it frequently procures a composed rest, after opiates have failed of success. In modern practice, however, it is chiefly employed externally, to diminish inflammation, to disperse tumors, to obviate mortification, to stimulate in cases of local palsy, and to allay rheumatic and paralytic pains. We state, on the authority of Dr. C. L. Hoffmann, of Mayence, the oldest physician now living in Germany, that camphorated applications in the malignant, confluent *small-pox*, are often the *only* means of saving the patient's life; and that he once restored to health a young lady in a hopeless situation, by using, in the course of *twelve days*, not less than *eighty-four ounces of solid camphor*, chiefly in the form of an ointment made with the yolk of eggs, spread on clean napkins, and applied, as often as they became dry, over the whole body.

Internally, camphor is given in nervous affections, in order to excite the vital power, and alleviate spasmodic complaints. It is recommended as singularly efficacious in cases of *ardor urinæ*, or scalding of the urine, and nervous head-achs: the dose may be increased from three to twenty grains; and, in cases of madness, from five to thirty grains; two, or three times a day, after the necessary bleedings, purgatives, and the tepid bath.—To render camphor properly diffusible in water, it should first be dissolved in a little spirit of wine, or expressed oil, and then well triturated with mucilage of gum arabic.

CANADA BALSAM, a transparent resinous juice, of an agreeable smell, and a warm pungent taste. It is imported from Canada, in North America, and may be considered as a very pure turpentine, being obtained from a species of the fir-tree. The genuine kind is of a light amber colour, and a firm consistence. Although it has not hitherto been much employed in medicine, yet it appears to be possessed of all the properties and virtues attributed to the balsam of Copaiva, to which we refer.

Campion. See Catch-Fly.

CANAL, an artificial cut in

the ground, which is supplied with water from rivers, springs, &c. in order to make a navigable communication between different places. There are various circumstances, upon which the particular operations, necessary for constructing navigations, depend; and which consequently increase, or diminish, the labour and expence of executing them: such as, the situation of the ground; the vicinity to, or connection with rivers; the facility or difficulty with which the necessary quantity of water can be procured; and many other requisites. The utility of canals to a trading nation are too well known; we shall therefore only refer to the following, among the many works that have lately been published on this important subject, in which the structure, economy, and advantages of canals are amply and perspicuously treated, viz. 1. Mr. FULTON's "*Treatise on Canal Navigation*;" 4to. 18s. Taylor, 1796. The author displays an ingenuous disposition, and a sincere wish to promote useful improvement. His work is well written, the engraving beautifully executed, and the whole is replete with useful information. 2. Mr. CHAPMAN's "*Observations on the various systems of Canal Navigation*;" 4to. 6s. Taylor. This performance also abounds with useful instruction, and forms a valuable and necessary addition to Mr. FULTON's work. 3. Mr. TATHAM's "*On the Political Economy of Inland Navigation, Irrigation, and Drainage*;" 4to. 1l. 6s. Faulder, 1799. This work likewise contains some valuable hints, and is not destitute of utility.

On the subject of clearing navigable canals of weeds, we shall treat under the head of WEEDS.

CANARY BIRD, or *Fringilla canaria*, is a species of finch, and a native of the Canary Islands. It is supposed to have been first brought to Europe in the 14th century. At a still later period, canary-birds were more generally introduced into Germany, where the greatest attention is paid to the breeding and rearing of these beautiful creatures, which are much celebrated for their song, and docility in imitating musical notes. Hence they have become a source of considerable emolument to the Tyrolese, who export vast numbers to various parts of Europe, and also to England. If treated with proper care, they will breed, and become as vigorous and healthful in this country, as in their native islands.

These delicate birds are subject to a variety of diseases; to prevent which, the greatest care should be taken to provide them with pure water and simple food.

During the time of moulting, which often proves fatal to many of them, a little white wine dropped on a piece of biscuit, or sugar, will be of considerable service.

CANARY GRASS, or *Phalaris*, L. a genus of plants, comprising twenty-four species, of which two only are cultivated in England; viz. 1. The *Caraniensis*, or the manured canary-grass, which is raised from seed, and requires the soil to be made very fine and light on the surface. It is sown the first dry week in February. The plant is generally ripe in the beginning of September, and requires to be a considerable time in the field, but it is seldom injured by wet weather.

ther. It is chiefly cultivated on account of its seeds, which are found to be best calculated for canary, and other small birds. It also nourishes the *Coccus phalaridis*, which is properly a native of the Canary Islands, but is become naturalized in England.

2. The *arundinacea*, or painted lady-grass, or ladies traces, which is occasionally sown in our gardens, on account of its beautiful striped leaves. It is of considerable utility for thatching ricks, or cottages, as this plant is more durable than straw. In the north of Europe, where its stalks attain the height of from two to six feet, it is mowed twice a year, and given to cattle, as a nutritious and wholesome food. We are, therefore, of opinion, that this species might also be successfully cultivated, for the same purpose, in Britain.

CANCER, a round, though unequal, and, at first, indolent tumor, generally situated in glandular parts, such as the breasts, arm-pits, &c. When this tumor grows large, is of a livid, blackish, or leaden hue, and attended with excruciating pain, it is called an *occult* cancer; but, when it becomes a sore, or ulcer, discharging a very fetid, ichorous matter, it is then an open, or *ulcerated* cancer. The latter species is by far the most dangerous, and has, by the most judicious practitioners of all ages, been considered as incurable by any *internal* remedies: the occult cancer, however, has sometimes, especially before it had attained a considerable size, been cured by external applications, of which we shall give a short account.

The causes of this formidable disease are not distinctly ascertained; though its origin is supposed to depend chiefly on a scrophulous predisposition of the body; which, if increased by depressing and debilitating passions of every description, as well as the cessation of periodical and salutary fluxes of blood, frequently produces that fatal malady.

The peculiar acrimony of the fluids which, by its stimulus, often changes a scrophulous ulcer into a true cancer, is of a very diversified nature; and thence arise the various forms and characteristics of this complaint, as well as the numerous difficulties with which the cure of it is attended. Hemlock and arsenic, used internally, and applied externally, have indeed, in a few instances, been attended with success; but it is, on the other hand, very doubtful whether these, or any other medicine, have ever cured a *real* cancer. Hence it is generally believed, that extirpation by the knife is the only certain remedy. Lately, however, a physician has appeared in the metropolis, who confidently maintains that he has discovered a method of curing a disease, which has hitherto baffled the ingenuity and skill of the most able and experienced practitioners. Although we have promised (see note to pp. 107 and 108 of our work) to analyze his medicines, and thus to ascertain whether they contain arsenic, yet having had no opportunity of performing the experiment, we are obliged to delay the farther account of that discovery, whether real or pretended, till we arrive at the article SCIRRHUS.—To compensate, in some degree, for this apparent defect, we shall communicate the latest and most important information on this subject, received from the Continent.

In cancers of the face, Dr. Handel has lately, and with uncommon success, prescribed the application of the expressed juice of the *Carduus tomentosus*, L. the woolly-headed thistle, or friars crown. This simple remedy was formerly in great repute, and strongly recommended by Borell, Stahl, Timmermann, and other continental physicians. Dr. Handel ordered his patients to anoint the parts affected, with the fresh juice, six or eight times every day; and he found, that, in the course of a fortnight, it checked the progress of the most malignant cancer. The editor of this work has, in *one* instance only, observed a similar happy effect, though there always appeared to be great alleviation of pain, and an abatement of the fetid smell, emitted from cancerous ulcerations, when this liniment was duly administered. For this purpose, he made use of a soft feather, but previously added to the juice about the eighth part of rectified spirit of wine, in order to precipitate the feculent particles, and also with a view to preserve it longer in a sweet state.—Dr. Handel farther asserts, that by the application of this juice, after the necessary internal remedies had been used, he has cured the itch, scald heads in children, the thrush, violent inflammation of the eyes, inveterate ulcers of the legs, &c.; especially in those constitutions which had been reduced by the use of mercurial medicines.—Notwithstanding these favourable accounts, we doubt whether a confirmed cancer will always yield to such superficial treatment; nay, it is admitted by all those foreign practitioners, that the juice of the woolly-headed thistle was of service *only* when applied to cancerous ulcers in the face, and produced no relief whatever, where the female breast was afflicted with that loathsome disorder. In such cases, unfortunately, all remedies hitherto discovered have been found ineffectual, unless they were applied in the earliest stage of the cancerous tumor. Thus it is affirmed by Bromfield, Collignon, Cullen, Theden, Unzer, and many other medical men of eminence, that the *timely* use of the *belladonna*, or deadly nightshade, has often dispersed glandular indurations, and large tumors of this description; but, as the internal administration of this virulent plant cannot safely be intrusted to those who are unacquainted with its nature, and the constitution of the human body, we shall only remark that it may, with equal advantage, be employed *externally*. For this purpose, the leaves of the deadly nightshade should be boiled in milk, to form a decoction sufficiently strong, and with which the part affected must be frequently fomented.

Another method of procuring relief in this painful complaint, has been discovered by Bassiano Carminati, an ingenious Italian, who first observed the benefit derived from the application of the gastric liquor of living animals to putrid and cancerous ulcers. Several other physicians on the Continent, and especially J. V. H. Köhler, have lately, by the test of experience, confirmed the truth of this observation. It is, therefore, much to be regretted, that this animal fluid cannot be easily procured in sufficient quantities, to produce so desirable an effect. For the gratification of our readers, we shall extract the following curious particulars from Köhler's treatise on chirurgical subjects, published at Leipzig, in 1796. From granivorous animals, such as cows, oxen, calves, &c. he obtained a quantity of gastric juice, but it was not in a pure state, and always mixed with alimentary matter; on the contrary, that of carnivorous animals, for instance, dogs, cats, and especially birds of prey, though in smaller proportion, was much purer. Among the latter class, the liquor extracted from the stomach of a large species of raven, which he terms in German, "*Golkraben*," he found to be the most efficacious. But each of these voracious creatures devoured twelve ounces of solid meat in twenty-four hours, as their usual allowance. They ought, however, to receive no food for twelve hours before, and after, the extraction of their gastric juice; an operation which is performed in the manner as follows: The neck of the bird must be stretched, till no folds or wrinkles are observed in it; an assistant then introduces into its throat a small tube, made of horn or bone, which has three longitudinal incisions, and two small holes near the top: through the latter a piece of tape is passed, the projecting ends of which are fastened across a little stick, in order to prevent the creature from swallowing the tube. Into this apparatus is introduced a proportionate piece of a moist, but well expressed sponge, by means of a whalebone rod, to which it is firmly tied, and then thrust down so far as to reach the stomach of the bird. An expert operator will easily ascertain the length to which he may safely proceed. After having thus fixed the apparatus, each raven is locked up in a different cage, or partition, made of boards, where it cannot easily disengage itself from this incumbrance. The liquor procured by carefully expressing the sponge, ought to be immediately applied; for, after having stood twenty-four hours, it becomes so corrupt that worms are bred in it; though, in its sweet state, it possesses neither odour nor taste. It is, however, difficult to obtain a sufficient quantity of this juice for effecting a complete cure of a cancer; as eight ravens afford only one ounce of it in twenty-four hours. Nevertheless, as the efficacy of this simple, though expensive, remedy, especially in eradicating the most virulent cancers of the face, is well attested by several respectable practitioners, we thought it our duty to insert the preceding account.

CANDLE, a light made of tallow, wax, or spermaceti, the wick of which is usually composed of several threads of cotton.

There are two species of tallow candles, the one dipped, and the other moulded; the first are those in common use; the invention of the second is attributed to Le Brege, of Paris. Good tallow-candles ought to be made with equal parts of sheep and ox-tallow; care being taken to avoid any mixture of hog's lard, which occasions a thick black smoke, attended with a disagreeable smell, and also causes the candles to run.

When the tallow has been weighed and mixed in due proportions, it is cut very small, that it may be more speedily dissolved; for otherwise it would be liable to burn, or become black, if left too long over the fire. As soon as it is completely melted and skimmed, a certain quantity of water, proportionate to that of the tallow, is poured in, for precipitating the impure particles to the bottom of the vessel. This, however, should not be done till after the three first dips; as the water, by penetrating the wicks, would make the candles crackle in burning, and thereby render them useless. To purify the tallow still more, it is strained through a coarse horse-hair sieve into a tub: where, after having remained three hours, it becomes fit for use.

Wax Candles are of various kinds and forms; they are made of cotton or flaxen wicks, slightly twisted, and covered with white or coloured wax. This operation is performed either by the hand or with a ladle. In order to soften the wax, it is first worked repeatedly in a deep narrow cauldron of hot water; then taken out in small pieces, and gradually disposed round the wick, which is fixed on a hook in the wall, beginning with the larger end, and diminishing in proportion as the neck approaches; to prevent the wax from adhering to the hands, they are rubbed with oil of olives, lard, or other unctuous substance. When it is intended to make wax candles with a ladle, the wicks being prepared as above-mentioned, a dozen of them are fixed at equal distances round an iron circle, which is suspended over a tinned copper vessel containing melted wax; a large ladleful of which is poured gently and repeatedly on the tops of the wicks, till the candles have acquired a proper size, when they are taken down, kept warm, and smoothed upon a walnut-tree table with a long square instrument of box, which is continually moistened with hot water, to prevent the adhesion of the wax. In other respects, this mode of making wax-candles corresponds with that of manufacturing them by the hand.

From the increasing demand and price of wax, various experiments have been tried, in order to discover proper substitutes, which might possess similar solidity. We are informed by a foreign journal, that this desirable object has been satisfactorily attained, by melting down an equal quantity of tallow and resin. In order to ascertain the truth of this assertion, we were induced to repeat the experiment, but without success: for, though the two substances incorporated, they had not a sufficient degree of cohesion; and, when moulded into a proper form, the tallow burned, but the resin dissolved, and separated from it.

In September, 1799, Mr. WILLIAM BOLTS, of London, obtained a patent for new modes of improving the form, quality, and use of candles, and other lights, made of tallow, wax, spermaceti, &c. This invention the patentee founds on four principles: 1. On the fabrication of the body of such lights, prior to, and independently of, the wicks which may be subsequently applied to them. 2. On the application of moveable wicks, which may be applied to, or extracted from the candles, or lights, any time after they have been made. 3. On the using of fixed, or ordinary wicks, for those lights or candles, at any period subsequent to the making of either; and 4. On placing the inflammable substance, while in fusion, in a close vessel, and submitting it there to the action of a vacuum, and of a pressure superior to that of the atmosphere. This was effected with a view to extract, by the vacuum, whatever elastic fluid may remain in it, under the ordinary pressure; and also to increase the solidity and whiteness of the substance, by the superior weight applied to it, when cooling.

From the very great utility of candles, they early became the object of adulteration: hence it is provided by various acts of parliament, that all adulterated candles shall be forfeited; and if any tallow-chandlers, or melters, make use of melting-houses without giving due notice to the excise-officers, they shall be subject to a penalty of 100l.; or, if they fail in informing those persons of their making candles, and thus prevent them from ascertaining the duties, 50l.; and if any person is convicted of making candles privately, they are forfeited, together with the utensils, and 100l. by the 5 Geo. III. c. 43. Those candles, however, for which the duty has been paid, may be exported, and the duty allowed; but, by the statutes of 8 Ann, c. 9, and 23 Geo. II. c. 21, no drawback is allowed on the exportation of foreign candles.

Although candles are preferable to lamps, as their light is less injurious both to the eyes and lungs, and as they do not produce so great a volume of smoke, yet a clean chamber-lamp, which emits as little smoke and smell as possible, is far superior even to wax-candles; for, 1. As all candles burn downwards, the eye necessarily becomes more fatigued, and strained during the later hours of candle-light; 2. Because they yield an irregular light, which occasions the additional trouble of snuffing them; and lastly, because, if the air be agitated ever so little, or if the candles are made of bad materials, they injure the eye by their flaring light.

Candock. See White Water-Lily.

Canine Madness. See Bite of a mad dog.

CANKER, a disease to which trees are subject; it proceeds principally from the nature of the soil, and causes the bark to decay. If the canker be seated in a bough, and a large one, the general practice is to cut it off at some distance from the stem; if a small one, close to it.

When the tree is thus open and exposed, it is liable to receive injury from the air, moisture, and insects. To prevent this, white lead and boiled oil, made into a kind of thick paint, with the addition of sublimate of mercury, has been recommended by Dr. Darwin, as an useful remedy, especially when applied to the wounds of those trees, the wood of which contains less acrimony, and is consequently more liable to be penetrated, and eaten by a large worm or maggot, that would otherwise consume the whole internal wood.

In the 13th vol. of the *Transactions of the Society of Arts, &c.* the ingenious Mr. Bucknall observes, that, in pruning, this medication ought never to be omitted, as experience has demonstrated, that mercury removes the noxious effects of canker in the more delicate fruit trees, so effectually as to influence the vegetation of plants, by affording both smoothness and a free growth to the bark.

He directs every stump, together with the decayed or blighted branches, and all those that cross the infected tree, or where the leaves curl, to be taken off smooth and even; the gum is likewise to be pared down close to the bark, and rather a little within it, but not so as to destroy the rough coat; the fissures, out of which it oozes, are next to be opened to the bottom, the blotches to be cut away, and the canker extirpated: all the wounds are then to be anointed with the medication, a little being smeared over that part of the canker which was not large enough to be cut. The tree must also be scored, and the moss rubbed off; but care should be taken to avoid breaking off a single branch, as this would be productive of dangerous consequences.

"A tree thus managed (says Mr. Bucknall), will, with its remaining free shoots, run large; which, as they require a great flow of sap, will keep the roots in constant employ, and thus necessarily establish it in permanent health." He also remarks that, where the sole object is to remove the canker, hog's lard will be found of considerable utility; but, if wet also is to be guarded against, it is by no means so beneficial as tar.

There is also another method of curing this disease, which has been tried with success; namely, where a branch of a valuable tree is likely to be destroyed by the canker, to inclose the affected part, and some inches above it, in a garden pot of earth, previously divided, supported by stakes, and tied together round the branch, which will then strike roots in the mould; and which, after some months, may be cut off, and planted in the ground: thus preserved, it will produce a new tree.

CANKER-WORM, a species of insects particularly destructive to corn, grass, and every other vegetable in which it can harbour. It has been erroneously supposed, that excessive and continual wet weather will destroy them, but this is so far from being true, that an instance has occurred of their having been found buried six feet deep, in a firm soil.

These worms, every fourth year, become flies, when they deposit their spawn on the ground, and thus produce maggots. Soot has been strewed on the land infested with these vermin, and various other remedies have been tried, but without success; except that practised in the county of Norfolk, where, some years since, the canker-worm was particularly pernicious. The expedient alluded to, is as follows: when they become flies, and are settled on the trees, especially those of oak, elm, and maple, they are shaken off, so as to drop on pack-sheets, or tilters, spread under them for that purpose. If, in this manner, they are destroyed soon after their first appearance, when in the state of flies, and before they can do farther mischief by lodging on the ground, their numbers will be considerably diminished, and, in a few years, they will be almost wholly exterminated.

Cantharides. See Spanish Fly.

CAOUTCHOUC, Elastic Resin, or *India rubber*, is a substance produced from the Syringe Tree, or *Iatropha elastica*, L. which is a native of South America. It oozes in the form of vegetable milk, from incisions made in the tree, and is principally collected in wet weather, when it flows abundantly.

Various conjectures have been formed by the most eminent botanists, and chemists, as to the means used for inspissating and indurating this vegetable substance. The general opinion, however, is, that it concretes gradually when exposed to the air. It is particularly celebrated for the uncommon flexibility and elasticity, which it displays immediately on acquiring a solid consistence, and for the many purposes to which it is applied by the Indians, who make boots of it that are impenetrable to water, and when smoked, have the appearance of real leather. They also make bottles of it, to the necks of which reeds are affixed, and through these the liquor is squirted by pressure. The inhabitants of Quito, in Peru, also prepare from this substance a species of oil-cloth and canvas, which are formed by moulds made of clay, and worked into a variety of figures. Over these moulds is spread the juice obtained by incision; and, as often as one layer is dry, another is added, till the vessel acquires a proper thickness; when the whole is held over a strong smoke of burning vegetables, which gives it the texture and appearance of leather. Before the operation is completely finished, the substance, while still soft, will admit of any impression being made on its surface, which is indelible.

The chemical properties, and other interesting peculiarities of this elastic resin, have been diligently explored by the most ingenious natural philosophers of Europe, from the time it was first known. Various experiments have been made to dissolve it, and to ascertain whether it would assume different figures, with the same facility as it did in its original state. This has been effected by the following simple process: Mr. Winch put a pound of good vitriolic æther into a bottle, capable of containing four pounds of any common fluid. On this æther he poured two pounds of pure water, stopped the bottle, inverted it, and agitated both liquids for several minutes, in order to mix, or, rather, to wash the æther in the water. On subsiding, as the æther floated on the top, he left the bottle in the inverted direction, opened it cautiously, substituted his thumb for the stopper, and thus let the water gradually escape into a vessel beneath. This operation he performed repeatedly, till the sixteen ounces of æther were reduced to five. Having thus obtained a very pure æther, he found it to be *the most perfect solvent of elastic gum.* When immersed into it, after being cut into small pieces, it began to swell in a very short time; and, though the æther acted on it but slowly at first, yet, in five or six hours, the whole was completely dissolved, and the liquor remained transparent. If too large a proportion of elastic gum be employed, it will subside to the bottom; and may, after being taken out of the bottle, be moulded into any form, so as to retain its former elasticity.

The caoutchouc is at present chiefly employed by surgeons, for the injection of liquids, and also by painters, and others, for rubbing out pencil marks, &c.; though we do not hesitate to say, that it may be advantageously used for socks, or even shoes and boots, as well as various useful articles of domestic convenience.

CAPER, or *Capparis*, L. an exotic genus of plants comprising seven species, of which the *spinosa*, or common caper, only is cultivated in Britain, but with great difficulty. This plant delights in the crevices of rocks, old walls, &c. and thrives luxuriantly in an horizontal direction. In the warm parts of Europe, it is propagated by seeds, and the buds, pickled with vinegar, &c. are annually imported from Italy, or the Mediterranean.

Capers are supposed to excite the appetite, to assist digestion, and to be useful detergents, and aperients, in obstructions of the liver.

CAPONTAIL GRASS. See FESCUE.

CARAWAY, the Common, or *Carum carui*, L. is an indigenous biennial plant, propagated from seeds, which ought to be sown in autumn; it blows in the second year, and decays a short time after the seeds are ripe. This plant furnishes a wholesome and agreeable food to goats, swine, and sheep, but is refused by cows and horses. The young roots are said to be more delicious than parsnips, and the tender leaves may be boiled with pot-herbs.

BECHSTEIN asserts, that caraway, if carefully transplanted into a richer soil, produces roots not inferior to those of the scorzonera, both in taste and utility: they also afford a very agreeable pickle, when preserved in vinegar, sugar, &c.

On account of their aromatic smell, and warm, pungent taste, the seeds of caraway may be classed among the finest stomachics and carminatives of our climate. To persons afflicted with flatulency, and liable to colics, if administered in proper quantities, they generally afford considerable relief, and may sometimes be used with advantage in tertian agues.

Caraway seeds, when finely pounded, spread on bread and butter, with a small quantity of ginger and salt, and eaten every morning and evening, have been found to be an excellent remedy against hysterics; unless this complaint arise from improper diet, acrid humors, bile, passion, &c. They are likewise used in cakes, and, when incrusted with sugar, are called caraway-comfits. Besides these multifarious purposes, caraway-seeds are distilled with spirituous liquors, on account of their flavour; but they produce a noxious, heating oil, which renders those liquors far more pernicious to health, than they are even in a pure state.

Carbon. See CHARCOAL.

CARDAMOM, or *Cardamomum*, a species of the *Amomum*, is a native of India, comprising two varieties. 1. The *majus*, or greater cardamom, which, when it arrives in England, is a dried fruit, or pod, about an inch long, and contains two rows of small triangular seeds, of a warm aromatic flavour. 2. The *minus*, or lesser cardamom, a fruit of an inferior size to that of the preceding variety, but considerably stronger, both in smell and taste.

The cardamom is, in this country, only known by its seeds, which are sometimes usefully employed in colds, flatulency, colics, and in laxity and debility of the intestines. Its seeds are said to possess this advantage over those of the pepper species, that notwithstanding their pungency, they do not immoderately heat or inflame the bowels.

CARDINAL FLOWER. See WATER GLADIOLE.

CARLINE, or CAROLINE THISTLE, the *Carlina*, L. a genus of plants comprising nine species, of which the *vulgaris*, or Wild Carline Thistle, only is indigenous, and generally indicates a barren soil. The other species are propagated from seeds, which should be sown in a bed of fresh undunged earth, but not be transplanted, as they will not bear this operation. When the plants appear above ground, they must be carefully weeded, and afterwards thinned, being left about a foot apart. The Carline blows generally in the second year, but, if the season be wet, it seldom produces good seeds, and often decays soon after blowing. Its flowers have the remarkable property of expanding in dry, and closing in moist weather; from which circumstance they are often considered as natural hygrometers. In Germany, the *acaulis*, a species of this genus, forms an article of food, and the roots, when dressed like artichokes, or made into salads, are highly esteemed. In Switzerland, this plant is also cultivated on account of its culinary utility; besides which it furnishes an agreeable food to goats, as they eat it eagerly, but it is refused by cows and other animals.

The Carline is known principally from its roots, as they are sometimes used in hysterical cases, for which they are said to be an excellent remedy. They have a strong smell, a sub-acrid, bitterish, aromatic taste, and were formerly imported from the more southern parts of Europe.

CARMINE, a powder, of a very beautiful red colour, partaking of the shades of scarlet and purple. It is used by painters in miniature; but, on account of its high price, they are often induced to substitute lake. The manner of producing it is preserved a secret by colour-makers; and, though many receipts have been published, none has ever been found to answer the purpose.

The following process, however, we shall communicate on the authority of the Gentleman's Magazine for 1753, in which it is asserted that this costly article may be made, even in greater perfection than that produced by the French artists: Take four or five gallons of pure water, and dissolve in it a sufficient quantity of pot-ash to make a strong lye. After having filtered the solution, put it in a brass pot, and boil in it one pound of the clean shreds of scarlet cloth dyed in grain, till they have totally lost their colour; then squeeze the shreds, and pass all the lye through a flannel bag. Dissolve two pounds of alum in a proper quantity of water, and add this solution to the lye; stir them well together, and the whole will become rather thick; it is then to be repassed through the flannel bag, and the liquor will run out clear; but if it be at all tinged, it is again to be boiled, with the addition of a small quantity of dissolved alum, passed through the bag a third time, and all the carmine will be left behind. Fresh water is then to be poured repeatedly into the bag, till all the alum is washed away; when the colour must be dried, so as to prevent any dust from settling on it, and may then be kept for use, being previously reduced to an impalpable powder in a glass or marble. If, however, in the boiling, so much water evaporate, as to require an addition, care must be taken to add only boiling water to supply the deficiency.

Carnation. See Clove-Pink.

CARNIVOROUS animals are those which seek for, and feed on, flesh. It is a question among philosophers,

losophers, whether man is naturally carnivorous. Those who are of a contrary opinion, rest their arguments chiefly on the structure of the human teeth, which are mostly *incisores*, that is, cutters, or *molares*, i. e. grinders, and not such as carnivorous animals are provided with: besides, it deserves to be remarked, that, even when we eat flesh, it has previously undergone an alteration by boiling, or roasting. Nevertheless, it must be allowed, that we are furnished with teeth necessary for the mastication of every kind of food, whence it may reasonably be inferred, that Nature has kindly intended, both the vegetable and animal kingdoms, for the sustenance of mankind.

CARP, or *Carpio*, L. is a species of the *Cyprinus*, a genus of fish comprising above thirty species. Carp are also called white-fish, on account of their glittering scales, and are distinguished from other fish, by having no teeth, the want of which is supplied by several small rough bones fixed in their throat. They were introduced into England during the 16th century.

These fish are much celebrated for their longevity, many of them attaining an age of from 60 to 100 years, and growing to the extraordinary length of six feet. They delight in muddy ponds, which are well sheltered from the wind, and into which should be thrown the liquor from cattle-yards, mixed with clay, peas, beans, oil-cake, &c. In order to fatten them, and increase their size, the growth of grass under the water should be particularly attended to; as they principally feed on it during the summer months. To effect this, when the water decreases in summer, the dry, naked sides of the pond should be raked, and grass-seeds abundantly sown: these will produce a plentiful supply of herbage, which, when the pond is filled up by rains, affords a feeding place, where the fish will speedily fatten. In the winter, they crowd together in the mire under the ice, which should be occasionally opened to admit air, for want of which the carp is often severely affected.—But where it is practicable, part of the water should be drawn off, which will be more beneficial to the fish, than to penetrate the ice. This should also be done, when the pond has been struck by lightning, or when the fish are sick, which sometimes happens, if the water become foul or turbid.

Carp are much celebrated for their docility, and have been known to be so tame, as to swim to the shore, and take their food, on being called, or summoned by the sound of a bell. In general, however, they are extremely cunning, and difficult to be caught, except during the time of spawning.—The best season for catching carp and barbel, is the month of July, and the most proper time, at day-break. Care must be taken to use neither lead nor shot in the lines; which ought to be proportionate to the length of the rods, and made of Indian twist, or strong pearl-coloured silk, armed at the bottom links with sea-grass, Turkey-grass, or strong silk-worm gut, perfectly free from knots or frettings.

When the spot for angling is fixed upon, it is requisite, on the preceding night, to throw in a considerable quantity of paste, prepared of bread and bran, or mixed with lob-worms cut to pieces. This purpose may also be effected by throwing in a mixture of blood and grains, which must be repeated three successive nights; the spot being marked with particular attention. In the dawn of the morning, after the depth has been plumbed with the greatest exactness, the bait for the first rod, which is to lie at the bottom, should be a well-scoured lob-worm, and the hook must be passed through its body, about three inches from the tail; that part being more agreeable to the fish than the head. An additional ground-bait should be thrown in, at the same place, on the three preceding nights. The worm being dropped as exactly as possible on the ground-bait just thrown in, the first rod is to be laid on the ground, and the second baited. The bait for this rod must be four red worms, properly cleansed and pierced through the head. The third rod ought to be baited with a paste prepared of the following materials: the crumb of white bread one day old, soaked in warm milk, till it has imbibed enough to make it of the necessary consistence; when the milk is to be pressed out, and a sufficient quantity of honey added, to impart to it a sweet flavour. A little saffron, well dried and powdered, must also be mixed, together with a few drops of oil of rhodium, in order to tinge it of an orange colour. It is then fit for immediate use; but care must be taken, that the floats for each rod be of the short single-plugged kind, and that the fish "be played deep;" as, if this caution be neglected, the fish will "break," and make its escape.

Carp are much esteemed for their delicacy and flavour, which may be greatly improved by keeping them in river water for a few days, before they are eaten. Their gall is in much repute among the Turks, for staining paper, and also for making a fine sap-green colour.

Formerly, it was erroneously believed that the frequent eating of this fish proved a certain remedy for dimness of sight; and, with that view, many persons used it as their daily food; though without consulting their health. Of all animal substances, carp is doubtless the most liable to putrescency; and as its fat is indigestible, it ought particularly to be avoided by febrile patients, invalids, and convalescents.

CARPET, a covering for floors, &c. manufactured of wool, or other materials, and worked with the needle, or in a loom. The carpets in the greatest estimation are those of Persia and Turkey; but a manufactory has been established at Paris, where they are made in the same manner as the true Persian carpets, to which they are little inferior. There is also a good sort made in Germany; these are often embellished with silk, and some are even made of dogs' hair. In England, carpets are manufactured of a superior quality; the most elegant and valuable of which are those known by the name of *Brussels*.

CARRIAGE, a vehicle which is employed in conveying persons, goods, merchandize, &c. from one place to another, and is usually constructed with two, or four wheels.

Carriages have various names, which, together with their structure, are so generally known, as to render any description of them unnecessary. From their great utility, more particularly when applied to the purposes of family-convenience, they have excited the attention of the most ingenious artisans, who have sedulously studied to improve them. Hence a variety of experiments have been made, in order to ascertain the best, and most proper mode of constructing them, and preventing the different obstacles which tend to impede their motion. To discuss these, would be to embark into too wide a field of inquiry into the principles of mechanics, and to deviate from that plan of conciseness we have adopted. Those of our readers, who may be desirous of acquiring minute information on this subject, will be gratified by a perusal of Mr. ANSTICE's "*Remarks on Wheel-Carriages*," 1789, 8vo. 2s. 6d., in which it is fully and ingeniously investigated; and the rules for constructing wheel-carriages are laid down, according to the strictest principles of mechanics.

CARROT, or *Daucus*, L. a genus of plants comprising ten species, of which the *Carota*, or common carrot, only is cultivated in Britain, where it was introduced from Flanders, in the reign of Queen ELIZABETH.

Carrots are propagated from seeds, which may be sown at different times, during the whole season; in order to procure a succession of young roots for the table. They require an open situation, at a little distance from a wall; the seeds should be previously rubbed between the hands, to take off their beards, as they will otherwise adhere to each other, and come up in patches; but if sown close under the wall, they will too quickly run up to seed, and produce indifferent roots.—These plants delight in a warm, light, sandy loam, which should be dug to a considerable depth, to facilitate the roots striking downwards, as they are apt to become forked, and to shoot out lateral branches. They grow most luxuriantly after turnips, which render the land more clear of weeds than it is found after any other crop. As a culinary article, the carrot is well known; it also furnishes a wholesome and nutritious fodder for cows: if given to them in the winter, and early in the spring, it greatly increases their milk, and imparts to it an agreeable flavour. Hogs thrive well on carrots, which they fondly eat, when boiled in their wash. A sparing allowance of these roots, besides the usual food, is said to produce an invigorating effect on hunters: plough, and cart-horses also eat them with avidity; and, while thus fed, require no corn, and very little hay. Oxen and sheep fatten very speedily on carrots; and, if the latter animals are "half fat," when put up, they will be completely so, in about three months. This vegetable has also been cultivated for feeding deer, in parks; a practice which, in severe winters, when every other kind of food is scarce, has been attended with advantage. As a fodder for cows, sheep, and swine, the tops of carrots are equally valuable with the roots. Nay, sometimes even hay has been made by mowing these tops, towards the latter end of June; yet they should not be cut so closely as to injure the crown of the root.

Although carrots, when left in the ground, will not endure the severity of winter, like cabbages and other vegetables, yet, by proper care, they may be preserved, so as to afford a wholesome and strengthening fodder for cattle. The method alluded to, is amply described in the eleventh volume of the "*Annals of Agriculture*," from which we extract the following account: Soon after Michaelmas, when the weather is dry, the carrots are dug out, and piled up on a bank of earth, raised about six inches above the level of the soil, and proportioned to the quantity of carrots intended to be preserved. On this bank is spread a thin layer of straw, on which the carrots are placed, with their tops turned outwards, and the ends folding one over another. The small roots are topt, and laid in the middle, to prevent the two sides from separating, by the greater pressure of weight on the centre. Every second or third row is covered with a little dry straw, and the stacking thus continued, till it reaches to the height of about four feet, when an additional quantity of dry straw is carefully spread over the tops, and the whole is thatched with sedge. Another line is then commenced in the same manner as the preceding, and sufficient room left for one person to pass between them. The intermediate space is next filled up with dry straw, and the outside defended with bundles of the same material, staked down, or fastened with hurdles. Thus secured, carrots will protect themselves from frost, by their own tops, and ensure a constant supply of fodder, at a period when almost every other vegetable is destroyed.

Various, but unsuccessful, experiments have been made to prepare sugar from carrots; as they yielded only a thick syrup, similar to treacle. Nevertheless, these roots have lately been more advantageously employed in distillation. After mashing, and properly fermenting them, M. BRIEGER, a foreign distiller, obtained from ten pounds of the roots, one quart of what is called "first runnings," and half a pint of a very strong ardent spirit. — As a German acre of land produces, upon an average, 10,000 pounds weight of carrots, he is of opinion, that a loose soil might be more advantageously employed in the culture of those roots, than in that of any seed-corn.—See also p. 326, BRANDY.

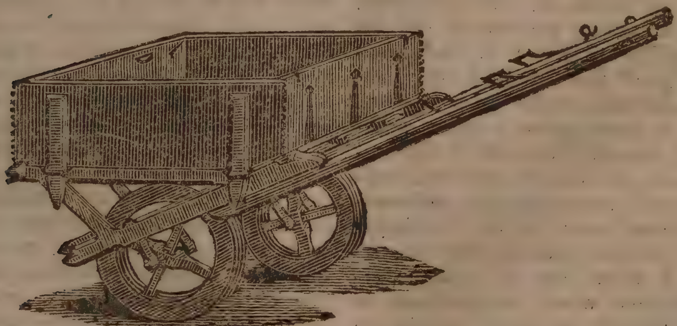
In medicine, a marmalade of carrots, on account of their strong antiseptic qualities, has been successfully used for preventing, and curing the *sea-scurvy*. An infusion of them has also been found to afford considerable relief to persons afflicted with the stone, and worms, but especially the tape-worm.—A poultice, made of the roots, has often been attended with similar success, in mitigating the pain, and abating the smell, of foul and cancerous ulcers.

CART, a land carriage, with two wheels, drawn either by horses or oxen, for conveying heavy goods, &c. generally at short distances.

In rural economy, the proper construction, and adaptation of carts to different soils and situations, are objects of the first consequence to every reflecting farmer. Nevertheless, it is surprizing, that little attention has been paid to this important subject, previous to the late improvements in agriculture; the flourishing æra of which, in Britain, commenced about the middle of last century, or the year 1754, when that patriotic Society for the Encouragement of Arts, Manufactures, and Commerce, was instituted at London. Since that memorable period, numberless inventions have been introduced into rural economy, and the names of Lord Romney, Mess. Shipley, More, and many other illustrious promoters of *true* national wealth, will ever be remembered by a grateful posterity. One of the most active members of this respectable institution is Mr. Arthur Young, of whose public spirit, and indefatigable labours, we have before us the most ample and satisfactory proofs. His "*Annals of Agriculture,*" though conducted on a plan too diffuse for ordinary readers, is a work replete with practical facts; and, on the whole, the best illustration of British husbandry. In the 18th volume of these Annals, we meet with an elaborate paper, entitled "*The Farmer's Cart;*" by the editor; from which we shall extract the following particulars: Mr. Young first observes, that the most general farmer's carriage in England, is a waggon, drawn by four horses, in which is conveyed corn, hay, wood, &c. but not dung or earth, which are usually moved by carts, or tumbrils, drawn by three, or four horses:—carriers almost universally employ broad-wheeled waggons, drawn by eight horses.

In Scotland, waggons were formerly used, but afterwards changed for large carts, and more lately for small ones, drawn by one horse.

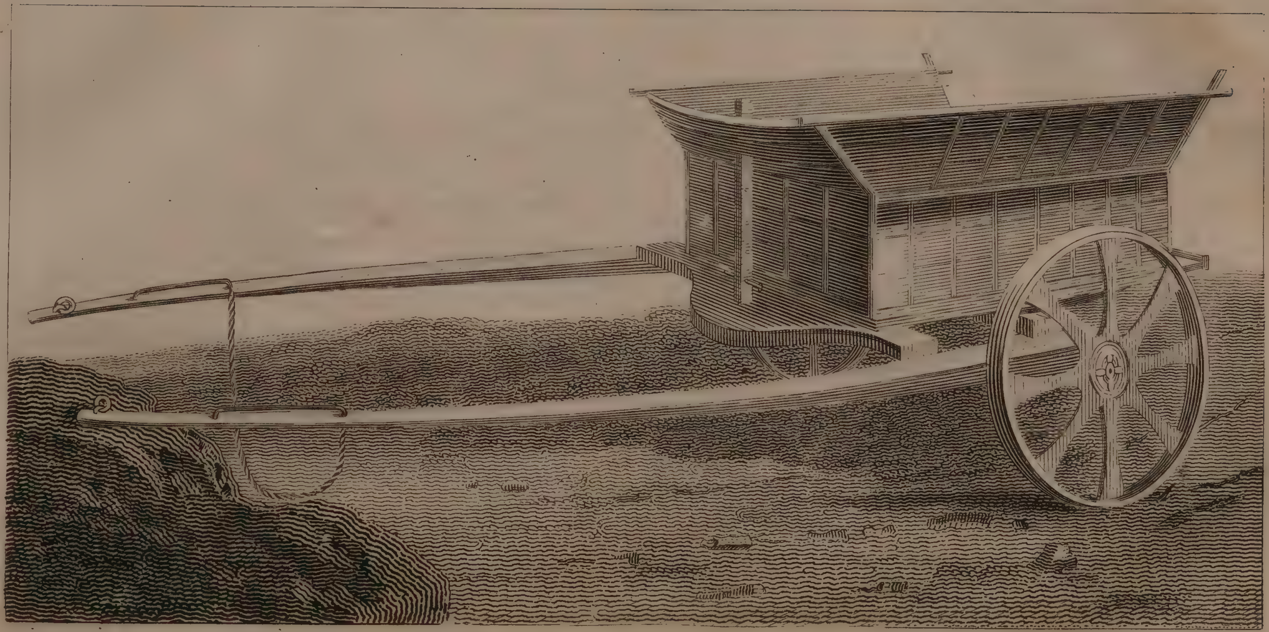
In Ireland, the most common vehicle at present is the *one-horse car,* with low wheels beneath the body of the machine; which has universally superseded the use of English carts and waggons, from a conviction of their inferiority. Nothing, says Mr. Young, exceeds the amazing expedition with which corn and hay fields are cleared in that country, by means of this useful, though inelegant implement. In consequence of such a decisive encomium, as well as the very favourable account given of this machine by the late Mr. Bakewell, of Dishley, Leicestershire, in the "*Communications to the Board of Agriculture,*" we have been induced to present our readers with the following cut, and description, of an *Improved Irish Car.*



The advantages of this vehicle, which was preferably employed, and strongly recommended, by the last mentioned agriculturist, consist in the facility with which it is laden, on account of its lowness; and, when gate-ways and roads are narrow, much room is gained by the wheels being fixed under the body of the cart. In such situations, therefore, it is well calculated for carrying manure, especially on meadow or ploughed land; and, for that purpose, its wheels ought to have a flat bearing, and to be at least six inches in breadth. Another peculiarity in the construction of this cart is, that its wheels are necessarily cylindrical; and that the facility of draught arising from this unobserved circumstance, was probably imputed to some other part of the machinery. But, though contrary to the generally received opinion, Mr. ALEXANDER CUMMINGS (in his *Observations on the Effect which Carriage-wheels with Rims of different shapes have on the Roads*, printed in the *Communications to the Board of Agriculture)*, has satisfactorily demonstrated, and it is likewise evinced by experience, that *the resistance to the cylindrical wheel is not increased, but diminished, by increasing the breadth and the flat bearing of its rim.* The knowledge of this fact is of very great importance to the farmer, as well as to the waggoner; for, by availing himself of this simple improvement, he may be enabled, in almost all seasons, to drive his broad-wheeled carts, &c. on his meadow or ploughed ground, when no narrow wheel can be employed.—Hence it would be superfluous to enumerate the farther advantages of this implement; yet, when the width of gate-ways and the breadth of roads will admit of the wheels being placed at the sides of the cart, *without confining the width of its body*, it will probably be more advantageous to have them at the sides, than under the cart.

One of the greatest advocates for *one-horse carts*, is Lord ROBERT SEYMOUR, whose excellent paper on this subject, dated Taliaris, 5th September, 1796 (inserted in the 27th volume of the *Annals of Agriculture)*, deserves the thanks of all British farmers. This patriotic nobleman strongly recommends the cart which he employs on his estates, as a most useful implement of husbandry. Convinced of its superior excellence, in many situations, we have thought proper to annex an accurate engraving of this cart, for the elucidation of which, we shall extract the following particulars from his Lordship's letter, addressed to the editor of the last-mentioned work:

The advantages of single-horse carts are universally admitted, wherever they have been attentively compared with carriages of any other description. By his own observation, Lord SEYMOUR is led to conclude, that a horse acting singly will do half as much more work as in conjunction with another, so that two horses will, separately, perform the work of three conjunctively. This difference, he believes, arises partly from the single horse being so near the load he draws, and partly from the point or line of draught being so much below his breast; as the wheels of single-horse carts are usually made very low. When a horse draws in conjunction with another, he is generally embarrassed by some difference of rate—the horse behind, or



One Horse Cart,

Invented by the R^{t}. Hon.^{ble} Lord Rob^{t}. Seymour.

or before him, being quicker or slower than himself: whereas a single horse has only his load to contend with, and is not inconvenienced by the greater or lesser height of his fellow. Nor is there any necessity for employing additional drivers; as horses, once in the habit of going singly, will follow each other as uniformly, and steadily, as they do when harnessed together: hence, on the most frequented roads in Ireland, one man conducts three, four, or five single-horse carts, without any inconvenience to the passenger.

Dimensions of the body of the cart employed by Lord ROBERT SEYMOUR:—Two feet eleven inches across the bottom; three feet nine inches, inside length; one foot high; sloping top, nine inches.

Iron wheels.—Two feet eight inches high; rim, three inches and a half wide, and from three-quarters to an inch thick; spoke, three inches and a quarter at each end, worked off to two inches at its centre.

In the introduction to the letter above alluded to, his Lordship observes, that the price of iron cast into wheels is 16s. per cwt.; and the weight of each wheel is about three-quarters of a hundred.—Two inconveniencies, however, arise from the use of low cast-iron wheels; namely, 1. That such iron is very liable to break upon concussion; and 2. That the course of a wheel of so small a diameter, occasions a very quick consumption of grease. The first of these objections is, in a great measure, removed by the facility with which the rim of the wheel may be repaired by the application of wrought iron; the latter being joined to the former by a rivet, the wheel acquires a degree of elasticity, and thus becomes, perhaps, stronger than it was when new. In order to furnish a regular supply of grease, Lord ROBERT has introduced four grooves or cavities in the boxes, increasing a little towards their centres: and with a view to defend the axle-tree, which consists of wrought iron, against the harder body of the box, he ordered the extremity of it to be steeled.

Mr. ARTHUR YOUNG, in the 18th volume of his *Annals of Agriculture*, before quoted, states the following dimensions of a single-horse cart, which he, by the test of experience, has found to be the most advantageous:

Buck.—Length, 5 feet 1 inch.
Breadth, 3 feet 7 inches.
Depth, 2 feet.
Cubical feet, 35 and a fraction.

On his farm of 350 acres, in Suffolk, Mr. YOUNG employs only five such carts; and observes, that he would not add more than one to the number, even though he should increase his business to 4 or 500 acres: hay, corn in the straw, faggot-wood, billets, dung, clay, marl, lime, bricks, &c. are all conveyed by them; carrying out 9, and even 10 coombs of wheat in sacks, and they are never drawn by more than one horse or ox.—No farm of the same extent, in an arable country, has less than three waggons, three tumbrils, and a light cart: the exact price of these different implements, in the year 1792, amounted to 109l.; while the building of *six* carts, upon Mr. YOUNG's plan, costs only 63l.: thus he saves about 40 per cent. in annual repairs. Beside this great reduction of expence, another circumstance deserves particular notice—As these carts had for many years been the object of ridicule, Mr. YOUNG offered a bet to one of his prejudiced neighbours, that he should load a waggon, till five horses could not stir with it; and Mr. YOUNG engaged to carry away that load *with ease*, in his carts, with four of the same horses; but the confidence, which his antagonist possessed in waggons, would not allow him to accept the offer.

The infinite benefit, concludes Mr. YOUNG, of which these carts would be to the roads, if their use should become general, may be easily conceived. In all the examinations before Committees of the House of Commons, as well as in most of the treatises published on the subject, it has been admitted that no police or management can keep the roads in repair, while such vast weights are permitted to be drawn in a single carriage. Parliament has been made so sensible of this fact, that repeated acts have been passed, by which the weight of waggons was limited, and a certain breadth of the wheels enjoined. Experience, however, has proved, that both are insufficient, and that the only method of effecting a favourable change, would be to prohibit numerous teams. Let every man carry whatever weight he pleases in a one-horse cart, and pay a light toll; let the load of a two-horse cart be limited, and the toll increased; farther lessening the weight, and raising the toll, when four horses are employed; and thus advancing the turnpike expences for every additional horse, till it amounts nearly to a prohibition. If such a plan were to be adopted, we should soon see all our roads in an improved state. *Rollers* have, indeed, been greatly indulged both in weight and toll; but this was a preposterous measure, for a roller will crush a pebble to dust, as well as a wheel, and the badness of roads must be attributed to the materials being reduced to powder, almost as soon as laid on, and either blown away in dust, or carried off in mud. Having followed some of SHARP's waggons, and observed the effect, Mr. YOUNG is persuaded, that the roller is more detrimental to the road than nine-inch wheels. In such an inquiry, facts only can decide the question: the Irish roads are made at an expence beyond comparison less than the English, and were, at the time he visited that country, greatly superior to those in England. This difference, in his opinion, must be attributed entirely to the use of one-horse carts, as he has explained in his "*Tour of Ireland*." "MANY HUNDRED THOUSANDS a year would be saved in England, if these carts were so favoured in road-acts, as to ensure a great decrease of waggons." On the whole, he ventures to recommend the use of one-horse carts to his brother farmers, with that confidence which ought to arise solely from numerous and varied experiments.

Having concluded the subject of single-horse carts, we shall only observe, for the information of those who employ teams with two-wheeled carriages, that several useful implements have lately been invented, for the more effectual stopping of such carts, in descending steep hills, and likewise for taking off the increased weight thrown on the shaft horse's back in all descents. A description of these excellent contrivances, illustrated by the necessary Cuts, we shall communicate under the respective heads of Locking-pole, and Wheel-drag.

In London and Westminster, carts are not permitted to carry more than twelve sacks of meal, 750 bricks, one chaldron of coals, &c. on pain of forfeiting one of the horses (stat. 6 Geo. I. c. 6).—By the laws of the city, carmen are forbidden to ride either on their carts or horses: they are to lead or drive them on foot through the streets, under the penalty of 10s. (stat. 1 Geo. I. c. 57).

By 38 Geo. III. c. 93, there is a duty of 1l. 4s. a year to be paid on all carts or carriages with less than four wheels, to be drawn by one horse, without any other than a tilted covering, and without any lining, springs, or ornament whatever, except a paint of a dark colour, with the words, "*a taxed cart,*" and also the owner's name, written upon it; and the price of such cart shall not exceed 12l.

Rolling-carts are very useful machines for carrying manure on low-lands during wet seasons. According to an account given by Mr. Richard Moyle, and inserted in the 14th volume of the "*Transactions of the Society for the Encouragement of the Arts, &c.*" such a cart consists of three circular pieces of strong elm, two feet in diameter, and each eighteen inches long, through which a strong iron axis is passed, so as to protrude a few inches on each end beyond the rollers; after all, allowing an inch between each piece, for the conveniency of turning round. On the projecting part of the axis, a fixed frame is placed, for supporting the body of the cart which, according to the nature of the soil, may be loaded to any degree, and employed simply as a roller, or for carrying manure, &c. on land where common wheels cannot be admitted.

By means of these rolling carts, the surface of the land is to be frequently compressed, in order to consolidate the soil more perfectly, so that the earthy particles may embrace the roots of the grasses, and retain their proper moisture; on which the luxuriancy of such soils in a great measure depends.

CARTILAGE, is a smooth, elastic, and insensible animal substance, somewhat approaching to the nature of bones.

Cartilages have a natural elasticity, the power of which is so great that, on being forced out of their situation, they spontaneously return to it, as soon as that force is removed. They are principally situated in those parts of the human body, which require a slight and easy motion, as in the ears, nose, &c. Their elasticity supplies the place of antagonist muscles, or such as are by Nature designed to counteract each other. Cartilages also invest all the ends of those bones, that are conjoined for performing motion; because, as they are both smoother and softer than bones, which are insensible, the attrition occasioned by the motion of the joints is thus more effectually guarded against.—See likewise Charcoal.

CASE-HARDENING *of Iron*, is a superficial conversion of that metal into steel, by a cementation of it with vegetable or animal coals. This operation is usually performed on small pieces of iron, worked into tools and instruments, by putting them together with the cement, into an iron box, which is closely shut, and exposed to a red heat, for several hours. Thus, the surface of the iron, to a certain depth, is converted into steel, to which a proper degree of hardness may be given, by a sudden immersion of the heated pieces into a cold fluid.—See IRON.

CASSAVA, or *Iatropha Manihot*, L. a native shrub of South America, eminently deserving to be transplanted to our climate; for it is asserted that one acre of its roots produces a quantity of food equal to that usually obtained from six acres of seed-corn. This shrub grows from four to seven feet high, is knotted, covered with an ash-coloured bark, and pithy within: its broad palmated leaves, together with its white and rose-coloured blossoms, render it a very beautiful plant. According to M. BRUNELLI, it may be propagated by seed, but more expeditiously by suckers: when these are planted in a deep, rich, and light soil, they vegetate with surprizing luxuriance, and produce in the course of one year, a white, soft, and farinaceous root, from one to two feet in length, and from five to six inches in circumference.

The very extensive use of the cassava, as an article of food in South America, is a striking instance of human ingenuity successfully directed to prepare wholesome nutriment from such vegetables as, in their natural state, are very active poisons. A mild, nutritious food is obtained from these roots in the following manner: Immediately after being gathered, they are washed and stripped of their thick rind by means of a knife: the heart, a pulpy mass, either white or yellowish, is repeatedly passed between cylinders, and turned by mill-work, till all the juice is expressed. The dry pulp, being thus freed from the poisonous juice, is a compound of farina and vegetable fibre, and requires no farther preparation than to be thoroughly dried, over a very slow fire. In this state, it will keep for several months in close vessels; and, when wanted, it may be formed into cakes, by kneading up with water, and baking it; or into pottage, by boiling it with water, and a little Cayenne pepper. The pure farina is the *tapioca* of the shops; it is separated from the fibrous part, by taking a handful of the pulp, after the juice is extracted, and working it in the hand, till a thick white cream appears on the surface; this being scraped off and washed in water, gradually subsides to the bottom, and after pouring off the liquor, the remaining moisture is dissipated over a slow fire, constantly stirring the farina, so that at length it concretes into grains, about the size of sago, which become hard by keeping. This is the purest and most nutritive part of the pulp, and forms a very wholesome and palatable food, which, if preserved in a dry place, may be kept for any length of time.

By heaping together the cassava-cakes, till they begin to heat and become mouldy, and then infusing them in water, to induce a very rapid fermentation, the Indians prepare a very sharp and disagreeable, but intoxicating liquor, which will not keep longer than a day, without spoiling. Although this liquor, previous to distillation, has a sweet and mild taste, yet, when drunk in any quantity, it occasions excessive swelling of the body, convulsions, and death.—

According to M. BRUNELLI, hogs, and some other animals, eagerly devour the fresh root, without the least injury. But Dr. BANCROFT, in his *Essay on the Natural History of Guiana*, &c. (8vo. 6s. 1769), states that the expressed juice of the cassava-root, when drunk by sheep, hogs, and poultry, proves inevitably fatal to them; yet the animals thus poisoned are always eaten by the inhabitants.—The best antidotes against the virulent effects of the cassava, in its crude state, are red pepper and rum, if immediately used. Fatal as this root is in its natural condition, it is rendered perfectly innocuous, and wholesome, by fire. By baking the meal, says the last mentioned author, it is converted into nutritious food, and the poisonous juice of the root is, by both the Indians and colonists, boiled with venison, pepper, &c. by which process they prepare an agreeable and salubrious soup.

We have enlarged upon the properties of this beneficial vegetable, because we think its general introduction into our West Indian settlements would be attended with the happiest effects; and that it might, by proper management, also be transplanted to the northern hemisphere. This, however, is certain, that exotics of almost every description might gradually be naturalized in colder climates, if the following particulars were strictly attended to: namely, 1. That they be placed in a soil and situation congenial to their original habit; 2. That in removing them farther northward, only the seeds and suckers of plants already accustomed to a cooler region, should be selected; and 3. That this method of transplanting them, be regulated upon certain principles, to be derived from a careful examination of the greater or less intimate connection, or affinity, subsisting between vegetables of the same class, or genus. Thus, the potatoe, artichoke, vine, mulberry-tree, and many other of the most useful vegetables, have been inured to climates very remote from their origin; and the three last mentioned are now enabled to withstand the severest winters.

As we intend, on similar occasions, to refer to this article, with regard to the method of depriving certain vegetables of their poisonous juices, we shall conclude this account with a few practical directions to that effect; because these will be applicable to any other tuberous and farinaceous root, as well as to seed, or fruit. Instead of grinding, or bruising such substances, in the rude manner adopted by the Indians, the roots, in particular, should first be properly peeled, and then grated upon a sieve. By moderately pressing this pulp with the hand, the juice, together with some feculent matter, will pass through; the latter will speedily subside, so that the liquor may be poured off and fermented, by which method it will probably be deprived of all its poisonous qualities: should this, however, not be the case, there is no doubt, that from the expressed juice of all *mealy roots* (if the fermenting process be duly conducted), a very pure ardent spirit may be obtained by distillation.

The pulp which remains on the sieve, must be either repeatedly washed with cold water, or soaked in several waters, without suffering it to ferment, till the liquor comes off quite clear: all these washings being put together, will deposit a mealy sediment; which, after pouring off the water, should be dried in a gentle heat; but the fibrous residuum on the sieve can be used only as fuel. Thus, the purest tapioca may be extracted from the cassava, and similar granulated masses may be obtained from European vegetables; many of which we have already mentioned in pp. 232 and 235, of our work, under the article BREAD.

CASSIA, in botany, a genus of plants, comprising thirty species, the most remarkable of which are:

1. The *cassia fistula*, L. or purging Cassia of Alexandria. It is indigenous in Egypt, and both Indies, and bears a cylindrical pod, containing a soft, black pulp, of a sweetish taste, which dissolves, for the most part, both in water and rectified spirit. This pulp is a gentle laxative, and frequently given, in doses of several drams, to persons of costive habits. In inflammatory complaints, it is sometimes administered in much larger doses, from one to two ounces, when acrid purgatives are improper; though it is apt to nauseate the stomach, to produce flatulency, and griping; especially if the pulp be of an inferior kind, or spoiled by long keeping: these effects may, however, be obviated by the addition of aromatics, and by taking it in a liquid form.

2. The *Cassia Senna*. See SENNA.

CASSIA-BARK. See *Laurus Cassia*, p. 201.

CASTOR. See BEAVER.

CASTOR-OIL is extracted from the castor nut, or the seed of the *Ricinus communis*, a native of the West Indies. These seeds are about the size of small beans, which, in their brittle shells, contain white kernels, of a sweet, oily, but somewhat nauseous taste. Nor is the expressed oil quite free from the acrimony of the nut; though it is, in general, one of the mildest, and safest purgatives; so that half a tea-spoonful for a dose has been given, with success, to new-born infants, for lubricating the first passages, and expelling the *meconium*. It is also one of the best vermifuges, and a most efficacious remedy for the dry belly-ach, and iliac passion, when administered in proper doses, to children and adults; viz. the dose for the former, from one to two tea-spoonfuls; and the latter, a table-spoonful, repeated every two or three hours.

As patients generally have a great aversion to this oil, in its pure state, it may be taken swimming either in a glass of peppermint, or simple water, or in the form of an emulsion, with mucilage, or with the addition of a small quantity of rum. The greatest precaution, however, is necessary with respect to the *quality* of this oil, as there are two modes of preparing it, namely, by decoction and expression: the former is of a brown colour, has a rancid, disagreeable taste and smell, and consequently unfit for internal use; whereas that obtained by expression, is more limpid, rather verging to a green colour, and almost tasteless; but, when spoiled by long keeping, it is likewise an improper medicine.

Externally, castor-oil warmed, and rubbed on the parts affected, has been successfully applied in that painful spasmodic contraction, and rigidity of the muscles, called the *tetanus*; as likewise mixed with opium and camphor, in the form of a liniment, to relieve the most distressing spasms, and particularly the *trismus*, or *locked jaw*; in which cases, however, it possesses no specific action.

CAT, or *Felis Catus*, L. a genus of animals, comprising twenty-one species, and belonging to the same class as the lion and the tyger. Though originally a variety of the wild cat, one of the most ferocious brutes, this animal is now domesticated, and bred in Britain, as well as in other parts of Europe, Asia, and Africa, of which countries it is a native. The former inhabits hollow trees, especially the oaks of large forests, and in winter retreats to the deserted holes of foxes and badgers. Its skin is an excellent fur, but by no means compensates the damage done by wild cats to game and poultry.

The domestic cat, when suffered to retire to thickets, easily returns to a wild state. Its colour is uncommonly diversified; but the most beautiful varieties are, the reddish Spanish cat, and that of Angora, with long silken hair. A tame cat generally attains the age of about twelve years: the female breeds in the first year; though it grows till eighteen months old; she usually produces from four to six blind kittens, after a gestation of fifty-five days; and carefully conceals them, apprehensive of the unnatural voracity of the male. It is farther remarkable, that the female also has been observed to devour her offspring, when it happened to be deformed, or monstrous.

The flesh of animals, or fish, is the most agreeable food to cats; for they partake of vegetable aliment only from necessity. As they chew with difficulty, frequent drink is indispensably requisite to the preservation of their health. There are, however, some plants of which they are excessively fond; and when indulged with them, present a variety of whimsical gesticulations: of this nature is the valerian root, and the herb called nep, or cat-mint, the *nepeta cataria*, L.: on the contrary, they shun other vegetables as their mortal enemies, for instance, the common rue, or *ruta graveolens*, L. Any substance rubbed with the leaves of this plant, is said to be perfectly secure from their depredations: for the communication of this useful fact, in domestic life, we are indebted to C. P. FUNKE, a German naturalist.

Cats enjoy a warm temperature, and a soft couch;—moisture and filth, as well as water and cold, are equally repugnant to their nature; hence they are continually cleaning themselves with their paws and tongue. Another peculiarity is, the *purring* of these animals, when they are cajoled, or flattered, by passing the hand over their backs: this singular noise is performed by means of two elastic membranes in the larynx, or the upper part of the wind-pipe. Their hair is so electric, that the expanded skin of a cat makes an excellent cushion for the glass cylinder, or globe, of an electrifying machine.

The flesh of cats is eaten by several nations, but the substance of the brain is said to be poisonous. From the intestines of these animals are manufactured the celebrated Roman chords, for covering the violin.

With respect to their peculiarities, we shall remark, that cats possess a very acute sense of both smell and sight; by the structure of their eyes, which sparkle in the dark, they are better enabled to discover objects of prey, such as mice and rats, at night, than in the day time: hence they ought not to be luxuriously fed, if kept for the destruction of those vermin. It is, however, to be regretted, that this useful domestic creature is one of the most deceitful companions. Constantly bent on theft and rapine, the cat is a compound of cunning and dissimulation, seizes every opportunity of doing mischief, and flies from punishment, when detected. It is, therefore, not a little surprizing, that many elderly ladies are so partial to these quadrupeds, that they will even suffer them to sleep in the same bed; a practice fraught with considerable danger; as the exhalation of cats is extremely detrimental to the lungs; besides which, they are liable to hydrophobia, as well as the more faithful dog. For these reasons, we would advise parents, not to permit their children to play for hours, with these animals, even though the swallowing of cat's hair should not be attended with such bad effects as many are inclined to believe.

Lastly, Whether the marvellous stories concerning the revengeful disposition of cats, be well founded, or otherwise, it cannot be doubted that many judicious persons have so invincible an antipathy against these creatures, that they have been known to faint in rooms where cats were concealed; and that no arguments were sufficient to efface the impression. We are, therefore, decidedly of opinion, that great precaution ought to be used in the treatment of the purring tribe; and, instead of provoking them to malice and anger, it will be more prudent to keep them at a due distance.

CAT-SALT, a beautiful granulated species of common salt, thus denominated by the manufacturer. It is made from the bittern, or leach brine, by the following process: When the common salt is drawn out of the boiling pans, it is put into long, wooden troughs, the bottoms of which are perforated, that the brine may drain off. Beneath these troughs, vessels are placed for the reception of the brine, and across them small sticks, to which the cat-salt adheres in large and beautiful crystals.

This salt is very pungent, and, though pellucid when in a mass, becomes white on being reduced to powder: it is sometimes used for culinary purposes, but more frequently employed by the manufacturers of hard soap.

CATAPLASM. See POULTICE.

CATARACT. See GUTTA SERENA.

CATARRH, or COLD, a disease arising generally from a sudden diminution of insensible perspiration, by exposing the body to a damp, or cold air, after having been, for some time, under the influence of a warmer temperature. It is at first attended with an increased secretion of mucus, from the glands and membranes of the nose, eyes, throat, windpipe, &c.: hence a defluxion of a thin, acrid humor, which irritates those glands and membranes, occasions some difficulty of breathing through the nose, with a sense of fulness, and sooner, or later, produces all the usual symptoms of a common cold.—Contrary to the prevailing opinion, we are convinced that bleeding is seldom, if ever, necessary

sary in these, and similar affections. As, however, catarrhs are sometimes attended with a slight degree of inflammation, and fever, their treatment must be regulated accordingly: but, if unaccompanied with febrile symptoms, there is no danger to be apprehended. In the latter case, only, we shall suggest a few directions for managing those frequent complaints, which are generally neglected at their commencement.

It was formerly maintained, that *all* colds may be cured by *sudorific* remedies; but experience has proved that this method, though sometimes successful, has often been productive of injury. In modern times, the opposite treatment has been adopted, and both the internal use, and external application of cold water, have been indiscriminately recommended. The true and proper plan, however, appears to be the medium between these extremes; for it cannot be doubted, that keeping the body too warm, and excessive indulgence in hot, diluent drink, predispose it to catarrhs; as, on the other hand, the internal and external use of cold water tends to strengthen the whole animal frame, and renders it less susceptible of the impressions of air and cold. But, unfortunately, the *preservative* means have, in this instance, been confounded with the *curative*, or those intended for effecting the cure.—Hence, in the beginning of every catarrh, the following particulars deserve attention:

1. To dilute and weaken the acrid humor, secreted by the glands: this purpose may be attained by inhaling the steam of water, and drinking proper quantities of warm diluents.

2. To prevent too great a defluxion of humors, or to render the mucus itself milder, and facilitate its excretion, it will be of great advantage to apply vesicatories contiguous to the parts most affected by the cold. (See BLISTER.)

3. To evacuate the concocted, or digested matter: this salutary effect is accomplished either by spontaneous defluxion, or by the pores and urine. Both must be principally intrusted to Nature; as we should assist, and direct, her operations only in the mildest, and most cautious manner.

Dr. MUDGE, in a treatise on this disease, recommends the steam of hot water, as a most efficacious and safe remedy, and which indeed he considers as almost *infallible*. The method of inhaling these steams is very simple; but he observes that, for healthy persons, who may accidentally see his machine, great precaution is necessary, not to make the experiment of respiring through cold water; as thus they would be almost certain of contracting a severe cold. For those troubled with a catarrh, he directs as follows: In the evening, a little before bedtime, the patient, if an adult, is to take three drams, or as many teaspoonfuls of paregoric elixir, in a glass of water: but, if a child under five years of age, one teaspoonful; or, from five to ten years old, two. About three quarters of an hour after, the patient should go to bed, and, being covered warm, the inhaler three parts filled with water, nearly at the boiling point (which from the coldness of the metal, and the time it ordinarily requires before it is used, will be of a proper temperature),

perature), and being wrapped up in a napkin, but so as not to obstruct the valve in the cover, which is to be placed at the arm-pit, and the bed-clothes being drawn up, and over it, close to the throat, the tube is to be applied to the mouth, and the patient should inspire and expire through it, for about twenty minutes, or half an hour.

It is very evident, says Dr. Mudge, as the whole act of respiration is performed through the machine, that by inspiration the lungs will be filled with air, which will be hot, and loaded with vapour, by passing through the body of water; and in expiration, all that was contained in the lungs will, by mixing with the steam on the surface of the water, be forced through the valve in the cover, and settle on the surface of the body, while under the bed-clothes.

The great use of this particular construction of the inhaler is, 1. As there is no necessity, at the end of every inspiration, to remove the tube from the mouth, in order to expire from the lungs the vapour which had been received into them, this machine, may, therefore, be used with equal facility, by children and adults. 2. As febrile symptoms frequently accompany the disorder, the valve, in that respect, is also of the utmost importance: for a sweat, or, at least, a free perspiration, not only relieves the patient from the restless anxiety of a hot, dry, and, sometimes, parched skin, but is, of all evacuations, the most eligible for removing the fever; and it will be generally found, that, after the inhaler has been used a few minutes, the warm vapour under the clothes will, by settling upon the trunk, produce a sensible perspiration, which will gradually extend itself to the legs and feet.

In any feverish habit attending this cough, it would be proper to take a draught of warm, thin whey, a few minutes before the inhaler is used; and after the process is over, the sweat which it has occasioned, may be promoted by drinking small draughts of weak, warm whey, or barley-water. The sweating is by no means so essential to the cure of a catarrhous cough, as that the success of the inhaler at all depends upon it; yet the Doctor observes, that its advantages are very important, when the disease is accompanied by febrile symptoms.

After this respiratory process is performed, the patient generally passes the night without the least interruption by the cough, and feels no farther attack than, perhaps, once, or twice, in the following morning, to throw off the trifling leakage, which, unperceived, had fallen into the bronchiæ and vesicles, during the night; the thinner parts of which, being evacuated, the remainder is easily expectorated.

However, continues Dr. Mudge, if the patient hopes not to be disappointed in the success of this process, it is essentially necessary that he strictly attend to the following rules:

1. As valetudinarians are but too well acquainted with the first symptoms of this disorder, the remedy must be used the same evening; which will, in an ordinary attack, be attended with an immediate cure: but, if the soreness of the respiratory organs, or the petulance of the cough, indi-

cate the severity of the cold, the inhaler, without the opiate, should be repeated the next morning.

2. If the use of this apparatus, &c. be delayed till the second night, it will be always proper to repeat the process the following morning, without the opiate, except where the attack has been violent.

3. Should the cough be neglected for some days, it will always be necessary to employ both parts of the process at night, and the succeeding morning, as the first simple inflammatory mischief is now most probably aggravated by an additional disease, of a chronic nature. But, if this should be omitted, and the cough continue to harass the patient, it is of the utmost consequence, particularly in delicate and tender individuals, to attempt the removal of it as soon as possible, before any floating acrimony in the constitution (from the perpetual irritation) receives an habitual determination to an organ so essential to life as the lungs.

If the patient, with ease and freedom, expectorates a thick, and well digested, inoffensive phlegm, there is generally but little doubt of his throwing off the disorder, with common care, in a few days; and till that be accomplished, a proper dose of paregoric elixir, for a few successive nights, will be found very useful, in suppressing the fatiguing irritation, and ineffectual cough, occasioned by a matter which, in the early stage of the disease, flows into the bronchiæ, during the night, and is generally too thin to be discharged by those convulsive efforts. But, should the cough still continue, notwithstanding a *free* and *copious* expectoration, and the discharge, instead of removing the complaint, become a disease greater than the constitution can support, it is possible that a tender patient, possessed of weak and relaxed lungs, may do himself irreparable injury, without the least appearance of purulence, or any suspicion of suppuration. In those cases, besides increasing the general perspiration, by the salutary friction of a flannel waistcoat, change of situation, especially long journeys on horseback, conducted as much as possible, through a thin, sharp, dry air, will seldom fail to remove the complaint. On the contrary, if the cough should continue dry, husky, without expectoration, and fatiguing to the breast, provided there be no apprehension of tubercles, either forming, or already formed, there is not, perhaps, a more efficacious remedy for it than half a dram of gum ammoniac, with eighteen, or twenty drops of liquid laudanum, made into pills, taken at bed-time, and occasionally repeated. This excellent remedy was recommended by Sir JOHN PRINGLE, and Dr. MUDGE observes, that he has, in many instances, found it to be very successful, and generally expeditious; for it almost uniformly produced an expectoration, and abated the distressing fatigue of the cough. The latter practitioner has, likewise, in many instances, known a salutary revulsion made from the lungs, by the simple application of a large plaster, about five or six inches in diameter, of burgundy pitch between the shoulders; as the perspirable matter, which is pent up under it, becomes so sharp and acrid, that it generally produces, in a few days, a very considerable itching, some little tendency to inflammation,

flammation, and frequently a great number of boils. This application should be continued (the plaster being occasionally changed), for three weeks, a month, or longer, if necessary.

Although seemingly a trifling precaution, yet it is by no means a useless one, to the patient, not to expose his shoulders to the cold air, while in bed, during the night; but to take care that they be kept warm, by drawing the bed-clothes up to his neck, when he reposes.

If, notwithstanding these, and other means, the cough should continue dry, or be unattended with a proper expectoration, and together with a soreness, produce shooting pains through the breast, and between the shoulders, accompanied with difficulty of breathing, flushes of the cheeks after meals, a burning sensation in the hands and feet, and other symptoms of a hectic fever, no time must be lost, as there is the greatest reason to apprehend, that some acrimony in the habit is determined to the tender substance of the lungs, and that consequently tubercular suppurations will follow. In this critical and dangerous situation, the Doctor observes, from long experience, that the patient will derive the greatest benefit from a change of air, and by strictly adhering to a diet, consisting of asses' milk and vegetables.—His advice concerning large bleedings, appears to us liable to many objections.

CATCHWEED, the TRAILING, or German Madwort, *Asperugo procumbens*, L. an indigenous plant, growing near roads, and amongst rubbish. Its angular stem bears blue, or purple flowers, in April and May. It is common near Buxley, in Sussex, and in Holy Island.

Sheep are exceedingly fond of this weed; and its tender leaves may be dressed and eaten as an excellent culinary vegetable.

There is another plant to which Dr. WITHERING gives the name of CATCHWEED, namely, the *Galium Aparine*, L.; but which is more generally denominated Cleaver's GOOSGRASS: hence we propose to treat of it under that article.

CATECHU, or *Mimosa Catechu*, L. or sensitive plant, which is a native of the East Indies, and comprises above sixty species. From this plant is produced the extract denominated catechu, which was for a long time erroneously called *Terra Japonica*, from the earthy particles it contains; but which are entirely adventitious, and consist of impurities adhering to it, while in the furnaces, or kilns, in which it is prepared.

The extract of Catechu, when in its purest state, is a dry substance, which may be reduced to powder, and almost entirely dissolved in water, or in spirits of wine. It is a mild, but excellent astringent, and leaves in the mouth an agreeable sweetness.—This medicine is more particularly useful in alvine fluxes; and where, on this account, astringents become necessary, it is, perhaps, the most salutary. It is also successfully employed in complaints peculiar to females, laxity and debility of the viscera, in general, and in various other diseases, which require strengthening remedies.

When dissolved in the mouth, the catechu has frequently afforded relief for weak and ulcerated gums;

for aphthous eruptions, or the thrush, and similar affections.

The best form in which catechu can be taken, is that of simple infusion in warm water, with the addition of cinnamon, or cassia: thus it is freed from its impurities, and rendered more palatable. It is given in doses from fifteen to forty grains, according to the age and constitution of the patient,

CATERPILLAR, or *Eruca*, a genus of insects, comprehending many species, of which that most generally known is the common, or garden-caterpillar. The natural food of these creatures consists of the leaves and verdure of vegetables; but, harmless as they appear, there are some species among them which destroy one another, whenever an opportunity offers: the generality of caterpillars, however, are very peaceable, and many species live together in the same place, without molesting each other. These would breed and multiply to an incredible degree, were they not devoured by other insects, which prey upon them, both externally and internally, and literally consume them alive.

Caterpillars are very destructive in gardens and fields, especially those denominated the black, and the black-canker caterpillar, which prey principally on turnips. The former insect is of the colour of soot; and, when full grown, about three quarters of an inch in length. It commences its depredations towards the end of August, or the beginning of September, and is particularly numerous, when the north or easterly winds prevail, To counteract the devastation occasioned by this insect, it has been recommended, at the first ploughing, to irrigate the furrows with lime-water, which will effectually destroy it; as few insects like the smell of any thing that has been burned.

The black-canker caterpillars are principally found in the county of Norfolk, where, from the great numbers of insects which have been washed upon the beach, by the tide, it is generally believed that they are not natives, but wafted across the ocean. These cankers are supposed to be the caterpillar state of the yellow fly, which is particularly destructive in fields planted with turnips and cabbages; for they have been observed regularly to assume the appearance of those flies. For this evil, there appears to be no other remedy, but to pull the creatures off their nests, and to watch the flies, which during the hot weather are daily depositing their eggs on those plants.

There is also another variety, called by gardeners the *grub*, the skin of which is very tough, and of a brown colour. This insect is particularly injurious, usually depositing its eggs in the very heart of the plants, through all the blades of which it eats its way, leaving behind a great quantity of its excrement, which is hurtful to vegetation. Grubs likewise burrow under the surface of the ground, and do great damage to young plants, by eating off their tender stalks, and drawing them into subterraneous holes. This mischief is principally done in the night; but, if the earth be stirred about an inch deep, where a plant is found to be thus injured, the insect will be discovered: and this is the only certain way of exterminating these noxious vermin.

When caterpillars attack fruit-trees, the most efficacious way to destroy them is the following: Make a strong decoction of equal quantities of rue, wormwood, and common tobacco, and sprinkle this liquor on the leaves and young branches every night and morning, while the fruit is ripening.

Various other experiments have been made with a view to extirpate these mischievous vermin. We shall, however, mention only the following methods, which have been attended with peculiar success:—Take three quarts of water, and one quart of vinegar; let them be heated till they nearly boil; then put one pound or more of pure soot into the mixture, and stir it with a whisk till the whole is duly incorporated. Sprinkle the plants with this preparation every morning and evening: in a few days all the caterpillars will disappear. This has also been effected by sprinkling plants (and more especially gooseberry-bushes, which are remarkably subject to the depredations of these insects) with a preparation consisting of one quart of tobacco-liquor, in which an ounce of alum has been dissolved. As soon as the plants or bushes appear to be in the least degree corroded, or any eggs are observed on the leaves, a brush should be dipped into the liquor, which, by drawing the hand gently over its hairs, is carefully sprinkled on them. If any eggs be there deposited, they never come forward after this application; and if those eggs have already been changed into worms, they either die, or sicken, so as to fall off the bush; in which case they may be easily killed.

When the trunk and boughs of trees abound with the eggs of caterpillars, especially in the early spring, it is advisable to rub the bark of all the affected places with a sponge dipped in soap-water; and, where the height of the tree renders it necessary, this operation may be facilitated, by fastening pieces of flannel to a lath or pole, after soaking them in a similar liquor.

About the middle of the last century, experiments were made to manufacture *paper* from the cods which caterpillars spin, and in which they undergo their transformations from a worm to a nymph, or chrysalis, and thence to a butterfly. These cods, after being cleared of the leaves that adhered to them, and well beaten, were reduced to a kind of pulp, which, when spread in water, was collected into the form, and made into sheets of paper of a coarse brown colour; but as some of them were much whiter than others, it was supposed, that by being beaten and washed a longer time in the mortar of the mill, they would acquire a greater degree of whiteness. At the present period, when the materials for manufacturing paper are exceedingly scarce, we would recommend a repetition of this experiment; for, if the result should be successful, considerable advantage may be derived from the cods of those insects, which occasion often irreparable damage to the industrious cultivator.—See also, INSECT.

WATER-CATERPILLARS, *Erucæ aquaticæ*, L. are thus called from their living under water. They feed on aquatic plants, and respire by their stigmata in the same manner as the common caterpillars of the garden.

There are, acccording to REAUMUR, two varieties of these insects, the one on the *Potamogeton*, or pondweed; the other upon the *Lenticula*, or duck-meat: the first of these is the larger; and, as its operations are more easily distinguished, it is better known than the other. Though strictly an aquatic animal, it does not delight in the water, and is extremely solicitous to avoid wetting itself. It is produced in the same manner as the land-caterpillar, from an egg which the parent butterfly deposits on the leaf of a certain plant, out of which the insect, as soon as it is hatched, gnaws a piece of a circular form. This it carries to another part of the same leaf, and places it so as to construct a cavity in which it may safely lodge. It then fastens down the piece to the larger leaf, by silk of its own spinning, leaving holes at certain distances, through which it may push its head, and prey upon the adjoining leaves: these are naturally so smooth, that they are seldom wetted; and, as often as its habitation becomes too small, the insect makes others successively, each being adapted to its periodical size, till it undergoes the usual changes into a butterfly. In this state, as soon as its wings are dry, it leaves the water, never to return again.

WOOD-CATERPILLARS, *Erucæ sylvestres*, are thus denominated, because they live, contrary to the generality of caterpillars, under the bark, in the trunk, branches, and roots of trees, and sometimes in the body of the fruit. They are produced from eggs deposited on the surface; and eat their way farther, as soon as they are hatched.

Some of these caterpillars leave their abode in order to change into their chrysalis, and thence into their butterfly state; but most of them remain there, and pass through all their changes. These insects would increase to an immense number, were they not destroyed in a similar manner with the common caterpillars, by a species of worms, that insinuate themselves into the fruit or tree inhabited by the former, which successively become their prey.

Various experiments have been tried to extirpate these pernicious vermin; but none has been attended with more success than that of lighting small fires near trees, about sun-set, into which they will eagerly fly; and thus, by burning their wings, meet with inevitable destruction.

CATHARTICS. See PURGATIVES.

CATMINT, or NEP, the *Nepeta Cataria*, L. a native plant growing on pastures and hedges, in a calcareous soil—near Bungay, Suffolk; Wick Clifts; on the beach at Rampside; Low Furness; Dudley Castle, &c. Its stalk is a yard high, and branched; the leaves are of a velvet-like softness; the blossoms white, with a tinge of red, spotted with purple, and appear in July.

This is a hardy plant, and easily propagated by seeds; it has a bitter taste, and strong smell, resembling a mixture of mint and pennyroyal. An infusion of the catmint is recommended as a good cephalic, and deemed a specific in chlorotic cases: two ounces of the expressed juice are usually given for a dose. Cats are exceedingly fond of it, especially when it is withered. Mr. RAY mentions, that he had transplanted the common catmint from the fields into his garden; but the cats soon destroyed it: those plants, however, which came up from the seeds, uniformly escaped; and thus he found the old proverb verified, namely, "If you set it, the cats will eat it; if you sow it, the cats will not know it."—The plant is eaten by sheep, but refused by cows, horses, goats, and swine.

Cats-Milk. See Wart-wort.

CATS TAIL, or Reed-Mace, the *Typha*, L. a genus of native plants consisting of two species: 1. The *latifolia*, or great cats tail, bearing a stalk from six to eight feet high, leaves a yard long, and somewhat sword-shaped, cylindrical catkins, and no blossoms; it grows on the banks of rivers, fish-ponds, and in marshes; 2. The *angustifolia*, or small cats tail, with semi-cylindrical leaves below, where sheathing the stem; but flat and strap shaped towards the end; it also grows in ditches and ponds, and is frequently met with in the clay-pits of Norfolk and Suffolk. There is, according to Linnæus, a variety of the second species growing among rocks, where its roots are confined; so that it becomes smaller, but its spikes are more numerous. Specimens of it have been found on Hounslow-heath.

The cats tail is one of those neglected plants which might be easily applied to various useful purposes. At present, its leaves only are employed, partly by coopers for calking the bottom of casks, and partly by the manufacturers of rush-bottomed chairs. In Russia, the woolly down surrounding the seed, is mixed with the feathers of quails, and used for stuffing bolsters. But the Germans have lately made successful attempts towards converting the downy catkins of this plant into a more valuable article of commerce. In 1789, M. Weichhan, an ingenious hatter of Ostritz, in Lower Lusatia, transmitted to the Economical Society of Leipzig, an excellent *hat*, manufactured of one part of this vegetable substance, and two parts of hare's fur. He assured the Society, that the mixture not only worked admirably well under the bow, but likewise formed a complete union when felted. A proportionate addition of Spanish wool, would probably afford a still better material, and produce hats sufficiently fine and elastic.

Professor Förster, of Halle, in the year 1790, sent to the Society above-mentioned, a specimen of blotting *paper* made of a mixture, consisting partly of the villous hair of the cats tail, and partly of the coarsest linen and woollen rags employed for that purpose; but Dr. Böhmer, whose botanical work we have frequently quoted, asserts, that a good writing paper has been manufactured of the dry down obtained from those catkins, after they had been, in a manner, parched by the heat of the sun; and that such paper was peculiarly fit for drawings and paintings.

CATTLE are those quadrupeds, which serve either for tilling the ground, or as food for man. They are divided into *black cattle*, which comprise horses, oxen, bulls, cows, and their young; and into *small cattle*, that is, rams, ewes, lambs, goats, &c.

Having incidentally treated on some of the animals that are classed under this denomination, we shall confine our present account to the management of cattle in general; pointing out such vegetables, as may be given them with advantage, together with a few supplementary rules, to be observed in the breeding of these useful animals, and some observations on the most common distempers to which they are peculiarly liable.

I. WITH RESPECT TO FOOD.

The first object in the article of food, is wholesomeness: wild cattle feed entirely on the green vegetables, which they find throughout the year. Similar nutriment should therefore, if possible, be procured for tame cattle, in all seasons; but such food can be found only among those plants, which are either constantly green, or arrive at maturity in the winter. Of all vegetable productions, the most exuberant, for this purpose, appears to be the cabbage, with its numerous varieties, of which we have already spoken: the disagreeable taste, which that plant is supposed to impart to milk, can be no reasonable objection to its use; as it may be obviated by boiling, or, still more effectually, by preparing it in certain vessels, of which we shall give a description, with a cut, under the head of ROOT-STEAMER.

Turnips and carrots constitute the next article, and cannot be too forcibly recommended, especially as a winter food. So very great is the produce of the latter plant, that, according to the account of Mr. ARTHUR YOUNG, twenty work-horses, four bullocks, and six milch-cows, were fed at Partington, in Yorkshire, for above five months, with carrots, the produce of three acres; nor did they, during that period, taste any other food, except a little hay. The milk, he farther adds, was excellent, and the refuse fattened thirty hogs, with very little additional food.

Potatoes and buck-wheat furnish a supply, equally excellent and wholesome. Horses are particularly fond of the latter, which also fattens poultry very speedily, while its blossoms afford a fragrant food for bees, at a period when the vegetable creation is, for the most part, stripped of its verdure. To these may be added, the plant, called whins, the utility of which, has but lately become generally known. They require, it is true, to be ground in a mill, before they are given to cattle, and do not materially ameliorate the ground, a circumstance considered as an objection to their culture; but, notwithstanding these apparent disadvantages, they produce an excellent and invigorating fodder, and constitute one of the cheapest articles of winter provision; as they continue green during the whole year, and will grow on the most indifferent soils.

Burnet, white beet, the *Mangel Wurzel*, or root of scarcity, having been already mentioned, it is unnecessary again to point out their utility in feeding cattle.

There is another branch of the vegetable creation, usually denominated *grasses*, which contain a variety of species, that are particularly useful for this purpose, such as the *Festuca ovina*, or sheep's fescue; the *Festuca rubra*, creeping, or purple fescue; and the *Holcus lanatus*, meadow soft-grass; the physical properties of which, we shall notice hereafter. To this number belongs likewise the *Astragalus glycyphillos*, sweet milk-vetch, or wild liquorice-vetch, or milk-wort, as it is differently called; which, independently of its utility in affording a wholesome and nutritious winter-fodder, deserves every attention from the cultivator, as it will flourish luxuriantly on the most barren soil.—

The *Lathyrus Aphaca* and *pratensis*, yellow vetchling, and everlasting tare; several species of trefoil and clover; the purple, or everlasting bush vetch, and the everlasting pea, all are most excellent fodder for cattle.—Fir-tops, that is, the tender shoots of firs, though not generally known, also constitute an useful substitute. A remarkable instance of this fact occurs in the fifth volume of the Bath Society Papers, where an ingenious correspondent mentions, that, being greatly in want of provender, having very little, or no hay, he was obliged to feed his cattle on fir-tops. And, though he had upwards of 400 head of horned cattle, yet he did not lose above four or five; while many farmers and graziers, who lived in the same county, lost one-half, and several of them almost their whole stock. Hence we seriously recommend farther trials to be made with this article, which, in our opinion, promises a wholesome and invigorating food, and might, in a short time, be procured without employing large quantities of land for the growing of winter provision.

The last vegetable that peculiarly merits attention, as affording a proper food for cattle, is the *Trifolium Melilotus officinalis*, L. common melilot, which frequently calls forth all the patience of the industrious cultivator; but which, from being a noxious weed, may become an inestimable resource. This plant has been given, both in a green and dry state, to horses, bullocks, asses, goats, and sheep, all of which have eaten it eagerly; it has also been allowed to pigs, which, however, relished it only while green. Let it suffice to observe, for the present, that, as the melilot grows on the worst soils, where it spreads like a shrub, and rises to the height of from three to five feet, great advantages may be obtained by planting it in desolate and barren places.

In enumerating the various vegetables which appear to be the most beneficial food for cattle, we have necessarily avoided entering into any particular details concerning their culture; because some of them have already been, and the rest will be, hereafter, noticed in their alphabetical series.

II. THE BREEDING OF CATTLE.

The English cattle are divided into several classes, or breeds, denominated from the different counties in which they are reared; as the Lincolnshire and Holderness, which are distinguished for their size; the Welsh and Norfolk breeds, which are as remarkable for their lean, and wretched appearance, as the Lancashire and Herefordshire are for their beautiful and healthy look. Besides these, there are several others, as the Sussex, Devonshire, or Somersetshire, which, though fine cattle, do not attract that attention, which is generally, and deservedly, paid to the Lancashire and Herefordshire breeds. The former of these is particularly celebrated for the improvements made by the late ingenious Mr. BAKEWELL, of whose mode of breeding we have already given a concise account, pp. 337 and 338.

There was a remarkable peculiarity in Mr. BAKEWELL's cattle; namely, their uncommon docility and meekness, which were so great, that a boy with a switch could, without any difficulty, conduct them from one part of his farm to another. This gentleness was the effect of management, and evinces the superiority of his mode of breeding. While we admire and acknowledge its excellence, we cannot but advert to the mischief which is frequently done by horned cattle, and doubtless arises from very contrary practices. Such injurious consequences, however, might be prevented by *tipping*, that is, by sawing off the points of the horns of cows, bulls, and oxen, and fixing on them small knobs of wood, about three inches in diameter; then boring a hole through the horn and wood, and clinching a nail on the opposite side. Although, by this precaution, the horns are in a manner despoiled of their beauty, yet, when compared with the advantage resulting from it, this trifling loss cannot be regretted.

Concerning that fatal disorder, the *rot in sheep*, Mr. BAKEWELL was particularly attentive to its origin and progress: he found, from experience, that it was generated solely by floods. When, therefore, particular parcels of his best breed were past service, he fattened them for the butcher; and to be certain that they would be killed, and not go into other hands, he used "*to rot them*" before they were sold. This singular practice appears to have been the offspring of jealousy: it was effected by overflowing a pasture, or meadow, in summer; as the soil thus inundated inevitably rots all the sheep that feed on it, the succeeding autumn.

In the breeding of *stallions* for obtaining cart-horses, Mr. BAKEWELL was also particularly successful; by observing the same rules of proportion as we have mentioned under the article "BLACK CATTLE;" and making them in like manner docile and gentle. His economical plan of feeding the latter with turnips, cannot be sufficiently recommended to every industrious breeder. All these roots were carted to the stalls, by which *one* acre went as far as *three*. With respect to the saving of straw, he observed similar care; for, by giving it to his lean beasts in small quantities, he preserved their appetite sufficiently keen to make them eat clean, and thus prevented an unnecessary waste for litter; which is but too prevalent among agriculturists. Nor was his hay consumed in a careless and extravagant manner; the same economical management that was conspicuous in other departments of his agricultural concerns, also prevailed here; and the measures he pursued, to ensure as large a quantity as possible at all seasons, display an ingenuity and spirit of husbandry that rarely occur. This great object was effected by watering his meadows (which were situated near a small brook), by means of cuts that intersect them, and convey water to those parts which are at a distance from the brook; and by making others for carrying off the water, after it had flowed the land. These various works, which were completed at a considerable expence, notwithstanding the disdain and censure of his neighbours, enabled Mr. BAKEWELL to float from sixty to eighty acres of land at pleasure; and he found his labours crowned with the most ample success; as no other annual manuring was required. Instead of thistles, ridges, furrows, holes, hills, &c. that are a disgrace to any farmer, those charming meadows present fine level crops of hay, and beautiful verdure, reflecting the highest credit on his character, as an enlightened, and public-spirited agriculturist.

The Herefordshire breed above-mentioned, appear to be a mixture of the Welsh, and a spurious race of long-horned cattle. Mr. Campbell, of Charlton, in Kent, however, is of opinion, that the true Herefordshire cattle, with respect to kindly disposition for feeding, or delicacy of flesh, is not more than equal to the true-bred Sussex; though the former are more complete in their make, generally wider and fuller over the shoulders or fore chine, and the breast or brisket, also in the after-part of the rump, which is much oftener narrow and shelly in the latter. In short, the cattle of Herefordshire are, in the opinion of the most experienced farmers, considered as the best in England for *oxen*, the *dairy*, and for *fattening*.

Besides the rules we have already stated, under the head of Breeding, we shall in this place observe, that cattle may be much improved by *crossing the strain*, or breed; which is said to be attended with the most beneficial consequences. This practice, though ridiculed by some prejudiced farmers, is nevertheless sanctioned by the opinion and long experience of many successful breeders, and especially the late Mr. Bakewell; who has recommended the propagating from the old breed, only, till a better could be procured.

In keeping live-stock on grain, as well as grass-farms, their kinds, size, and number, in proportion to the means of subsistence, deserve unremitted attention; as likewise the modes of keeping them, and saving their manure. It is asserted, that English cows require, in general, from one to two acres of pasture: this is mostly *made*, by sowing grass-seeds after the ground has produced crops for many years, being both ameliorated and exhausted under manurings and good tillage. Such land continues several years afterwards in grass, which is carefully cleared of brambles and strong weeds. During this time, the cows drop their dung, which is exposed on the ground, to be exhausted by the united effects of the sun and wind; and which, according to the old system, is supposed to benefit the soil in a considerable degree. But the good effects of this irregular method of fertilizing our pastures is, in a great measure, counteracted by the continual treading of the cattle; and we have every reason to hope that such wasteful and unprofitable modes of manuring will sooner or latter be relinquished, and better practices be generally adopted.—See Irrigation.

The plan which prevails at present, is attended with this advantage, that rich grass-pasture will keep grown cattle at the rate of $1\frac{1}{2}$ of an acre per head, during the six warmer months; and common pasture, at the rate of two acres each. Thus, they require very little attention; and, as they range at pleasure, and drop their manure on the field, the expence and labour of heaping up, carting out, and spreading it, are entirely saved. On the other hand, by the cattle treading on the grass and pasture, the value of the latter is much diminished. Besides, pastures require expensive fences; the dung being scattered on the ground, is exposed to exhalation and waste, by the joint action of the sun and weather, and is thus greatly reduced: to this must be added the time and trouble bestowed on driving horses and oxen to the field, and thence to the stable or stall. These inconveniencies may, however, be obviated, and the cattle supported at less expence, by *soiling* them, a practice now becoming general in this country, and which cannot be too strongly recommended. By this means, very few or no division-fences are required: instead of $1\frac{1}{3}$ of an acre, one-fourth part will suffice for the subsistence of a beast during the six warmer months; the whole of their manure is well preserved, and given to the soil, where it is most wanted, and in the best condition; the land is not trodden in, and the cattle always ready for immediate use. They are also kept more cool, are less tormented by flies than if pastured, acquire good coats, and full flesh; though they consume a much smaller quantity of food. Many persons, however, may object to the laying aside of division-fences, that bad seasons will happen, when no grass can be cut and carried in, on account of heavy rains, or cold winds which retard its growth; and, consequently, that it will be requisite to have some fields divided off, in which the cattle may find pasturage. To these it may be answered, that it will always be found a more safe and profitable plan to keep a quantity of hay in store, to meet the contingencies of unfavourable seasons, and to feed beasts in the manner practised in towns, where they frequently are kept on hay and straw, during the whole year, and thrive exceedingly well.

Much, however, depends in the fattening of cattle, on their "*thriving disposition:* singular as it may appear to many of our readers, the tendency of animals to become fat, is not a little promoted by what is called, *sweating them*; a practice which has been attended with uncommon success. This has been particularly experienced by the ingenious Mr. MOODY, who asserts, that the hotter cattle are kept, the better they will fatten. He, therefore, shuts them up in an ox-house, and for some time admits no air to enter through the holes of the doors. The breath of so many beasts, and the heat of their bodies, soon make them sweat exceedingly, and when this is at its highest point, they most speedily fatten. After sweating two weeks, all the hair falls off, a fresh coat appears, and they sweat no more: but those beasts which do not sensibly perspire, seldom grow fat.

Linseed oil-cake remarkably contributes to the fattening of cattle, and renders their dung much richer than any other vegetable aliment; but, as this article is advancing in price, and difficult to be procured, it has lately been superseded by linseed-jelly, which is incomparably superior, and, when given with hay or meal, makes an excellent mixture for stall-fattening. It is prepared as follows: To seven parts of water put one of linseed, which has been previously steeped for 48 hours; then boil it gently for two hours, stirring the mass continually, to prevent it from burning. It should afterwards be cooled in tubs, and mixed with meal, bran, or cut chaff. Mr. MOODY gave two quarts of this jelly every day to each large bullock, which amounts to little more than one quart of seed in four days; and is a great saving in the article of food.

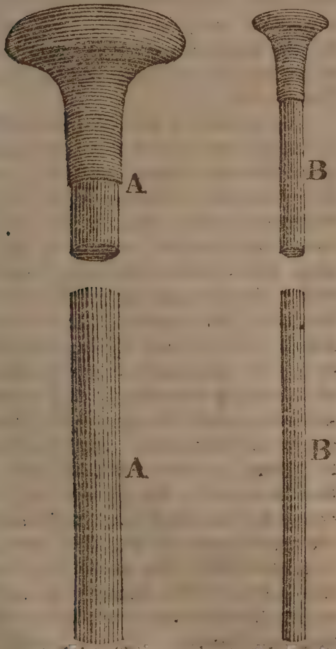
Having already, in the articles Black Cattle and Bullocks, stated the most proper method of fattening cattle, we refer the reader to those heads, and proceed to discuss the last section of this subject.

III. The Diseases of Cattle.

No distemper is perhaps more common among these useful animals, than that of being swoln, that is, *blown* or *hoven*, as it is termed by farmers. It arises either from their being exposed to damp situations, or from eating too greedily of any succulent food, such as turnips, clover, particularly *red clover*, which is a dangerous food for horned cattle; for, when wetted by dew or rain, it may prove a destructive poison. For this fatal malady, various remedies have been tried, with more or less success, of which we shall select the most effectual and expeditious. The general practice is, to make an incision with a penknife in the body of the affected animal, in order to give vent to the confined air: the wound is then covered with a common or adhesive plaster, to prevent external cold from penetrating it; and thus the danger, in general, is speedily removed. But, where it is practicable, it surely behoves us to employ more gentle remedies for the alleviation of this disorder: we, therefore, extract with satisfaction, the following recipe from the 33d volume of the *Annals of Agriculture*; where it is announced as a specific for hoven cattle, even in the most desperate cases; effecting a cure within the short space of half an hour.—Take three quarters of a pint of olive oil; one pint of melted butter, or hog's lard; give this mixture by means of a horn or bottle; and if it does not produce a favourable change in a quarter of an hour, repeat the same quantity, and walk the animal gently about. For sheep attacked with this malady, the dose is, from a wine glass and a half to two glasses.—Besides these remedies, instruments have been invented for the purpose of relieving blown cattle: two of these contrivances we shall describe, as being particularly distinguished for the ingenuity of their construction, and the speedy relief they afford. The first is a flexible tube, invented by the celebrated Dr. Munro, Professor of Anatomy at Edinburgh: it consists of iron wire, about one sixteenth of an inch in diameter, twisted round a rod three eighths of an inch in diameter, and made of polished iron, in order to give it a cylindrical form; the wire, after being taken off the rod, should be covered with smooth leather. To the end of the tube, which is intended to be passed into the stomach, a brass pipe two inches long, of the same size, or rather larger than the tube, is to be firmly connected: and to prevent the tube from bending too much within the mouth, or gullet, an iron wire, one eighth of an inch in diameter, and of the same length as the tube, is put within it, but afterwards withdrawn, when the tube has entered the stomach.—As Dr. Munro has ascertained, that the distance from the fore-teeth to the bottom of the first stomach of a large ox, is about six feet, the tube ought, therefore, to be at least two yards long, that it may operate effectually in the largest oxen. When the instrument has been introduced into the stomach, it may remain there for any length of time, as it does not ob-

obstruct the respiration of the animal: the greater part of the condensed air will be speedily discharged through the tube; and, should any ardent spirits, or other liquor calculated to check the fermentation, be deemed necessary, it may be safely injected through this pipe. In short, the flexible tube here described, has been found of infinite service in saving the lives of cattle, and especially of sheep, when subject to similar disorders, or any other swelling peculiar to these creatures.

Another *Instrument for relieving hoven cattle and sheep*, is that contrived by Mr. Richard Eager, of Graffham farm, near Guildford. Its peculiar simplicity, and great utility, have induced us to subjoin the following representation.



A, A, is the knob of wood, and part of the cane to which it is fastened, of a proper size for oxen: the length of the cane should be at least six feet.

B, B, is the knob of wood and part of the cane, calculated for sheep, and the length of which ought to be about three feet.

When any beast is blown or hoven, Mr. Eager directs a person to lay hold of it by the nostril, and one horn, while an assistant steadily holds its tongue with one hand, and pushes the cane down its throat with the other. Care, however, should be taken, not to let the animal get the knob of the cane between his grinders, and also to thrust it down far enough; because its whole length will do no injury. As there will be found an obstacle at the entrance of the paunch, the cane must be pushed with additional force; and, as soon as a smell is observed to proceed from that place, and the animal's body sinks, the cure is performed, and Nature will complete the rest.

Mr. Eager justly attributes this disorder to the superabundance of air introduced into the stomach, by eating too large quantities of succulent food, which occasions a greater than natural portion of wind to ascend from the paunch of the beast. This forces the broad leaves before the passage, at the entrance of the stomach; and these leaves prevent the wind from passing upwards in its regular course. Thus the paunch immediately begins to swell; the heat of the body rarefies the air, so rapidly as to impede the circulation of the blood, and the animal, whether bullock or sheep, unless instantaneous relief be procured, expires in half an hour.

In justice to Mr. EAGER, we cannot omit to mention, that the Society for the Encouragement of Arts, &c. in 1796, voted to him a reward of fifty guineas, for communicating to the public his simple, yet effectual, method of relieving cattle thus dangerously affected; and that the Earl of EGREMONT has candidly testified his conviction of the propriety of the principles on which Mr. EAGER's opinion, relative to the cause of that distemper, was established. In short, several respectable persons have farther attested, that the practice, also, has been attended with complete success.

There are various other distempers, to which the farmer's live-stock are frequently subject; such as the worms, or botts in horses (see p. 318), the mildew, murrain, quarter-evil, rot, scab, &c. among different species of cattle. With respect to the nature and cure of these, we refer to the order of the alphabet: such of our readers, however, as may wish for more minute information, on the subject of cattle, will probably be gratified by the perusal of Mr. CULLEY's "*Observations on Live-Stock,*" (8vo. 4s. 6d.); a small work that was published a few years since, and is believed to possess considerable merit.

Before we conclude this interesting article of national importance, we shall add a few general remarks, tending chiefly to preserve the health, and improve the physical properties of cattle. It is admitted, by all enlightened breeders, that *cleanliness* is one of the most essential requisites to the prosperity of those animals; and we may venture to add that, in this respect, a degree of attention ought to be paid, little inferior to that bestowed on the human frame. Hence, frequent washing, especially after hard labour; friction with proper brushes, and curry-combs, gentle walking after a fatiguing journey; and the immediate removal of litter, both from the stalls, and farm-yards, should not be neglected. But, alas! let us look around, in the vicinity of London, and inspect the filthy situation of cows, in general, which are kept in a state worse than hackney coach-horses, for the *sole* purpose of giving the greatest possible *quantity* of milk, without regarding its quality—every judicious person will shudder at the picture. And yet, we derive from these beneficent brutes a considerable part of our daily sustenance, especially for children, and those persons whose organs of digestion have not been impaired by the habitual use of fermented, spirituous, or intoxicating liquors. See MILK.

In a preceding part of this work (p. 276), we have pointed out the great necessity of supplying BLACK CATTLE with sufficient quantities of common salt; and, for the reasons already stated, we are of opinion, that ALL kinds of cattle, especially *sheep*, would be much benefited by the continual use of this simple and natural spice, which eminently conduces to the digestion of succulent vegetables, and is almost a specific for preventing the effects of flatulence. *Salt* cannot be given in excess: it is affirmed, that it *enables the farmer to increase his live-stock; as it augments the nourishment of the food eaten, in proportion to the quantity of saline matter.* It is also said greatly to improve the wool in quality, as well as quantity. Hence it ought to be freely given to sheep, and cattle of every description: but, to imitate Nature, it should be previously dissolved, and then mixed with a pure, fine clay, in a mass, which is to be placed under shelter, so that the animals may lap it at pleasure: such is the process which the unprejudiced grazier will be disposed to adopt.—Lastly, Mr. BORDLEY, the American, relates a fact worthy the attention of British farmers. About sixty years ago, he learnt, from a country farrier, that, "once or twice a week, giving salt to horses, effectually secures them against *botts*;"—ever since that period, he has experienced the good effects of this management; and adds that, during twenty years residence on his farm, at Wye, in Maryland, he always kept upwards of fifty horses on the banks of a river, containing *salt-water*, and never met with a single instance of that disease.

CAUDEX, a botanical term, signifying, in general, the stem, or trunk of a tree. It is properly that part of plants which joins together the *plumula*, or leaf, and the *radicle*, or root fibres; and which is called the caudex, by LINNÆUS, when applied to entire plants. He consequently divides it into the ascending and descending body of the vegetable: the former contributes to the formation of the trunk, the latter to that of the root. In herbs and shrubs, the caudex is denominated *Caulis*, or the stalk.

Dr. DARWIN observes, that, in herbaceous plants, the caudex is generally a broad, flat, circular plate, from which the leaf-stems ascend into the air, and the radicles, or root-fibres, descend into the earth. Thus, the caudex of a plant of wheat lies between the stem and the radicles, at the basis of the lowermost leaf, and occasionally produces both new stems and radicles, from its sides; whereas that of a tulip is situated under the principal bulb, and generates new, though smaller ones, in the bosom of each bulb-leaf, besides one principal, or central bulb;—the caudex of the orchis, and of some species of the ranunculus, lies above their bulbous roots; but those of the buds of trees constitute the longitudinal filaments of the bark, extending from the *plumula*, or apex, of the bud on the branch, to the base of it, or its root-fibres, beneath the soil.

The elongation of the caudexes, which takes place in the buds of trees, says Dr. DARWIN, is analogous to what happens to some herbaceous plants, as in wheat: when the grain is buried two or three inches beneath the soil, an elongation of the caudex occurs almost up to the surface, where another set of fibrous roots are protruded, and the upright stem commences. It is the same with tulip-roots, and also those of many other vegetables, when planted too deep in the earth.

This caudex of the buds of trees not only descends, as before described, but likewise ascends from each bud to that above it; as on the long shoots of vines, willows, and briars; in this respect, resembling the wires of strawberries, and other creeping plants. Thus the caudex of perennial herbaceous plants consists of a broad plate, buried beneath the soil, to protect it from the frost; while that of the buds of trees is furnished with a long, vascular cord, extending from the bud, on the branch, to the radicle, beneath the earth, and enduring the winter frosts, without injury.

When treating of *vegetable generation,* and the organs of reproduction, Dr. DARWIN, in his "*Phytologia,*" mentions a remarkable *animal* fact, illustrative of this curious, and important subject: Many insects, such as the common earth-worm, and the polypus, are said to possess so much life, throughout a great part of their system, that they may be cut into two or more pieces, without destroying them; as each part will acquire a new head, or a new tail, or both; and the insect thus become multiplied. How exactly this is resembled by the long caudex of the buds of trees, which possess such vegetable life, from one extremity to the other, that when the head, or plume, is lopped off, it can produce a new plume; and when the lower part is cut off, it will generate new radicles; and thus may be wonderfully propagated. See also BUD, BULB, and LEAVES.

CAULIFLOWER, the *Botrytis,* L. a variety of the *Brassica oleracea,* or sea-cabbage, a native of the Isle of Candia, but, of late years, has been so far improved in Britain, as to exceed, in size and flavour, those flowers which are produced in most parts of Europe.

Cauliflowers are raised from seeds, which ought to be saved only from large, and white flowers; as, without this precaution, they will not prosper. The seeds should be sown in March, in a rich, but not too dry soil, where the young plants, on their first sprouting out, may be sheltered from the evening frosts, which usually happen at that season. About the middle of April, while in their first leaf, they should be transplanted into a nursery, five or six inches apart; where they must remain till the latter end of May, or the beginning of June, when it will be proper to remove them to those spots, in which they are intended to blossom. The best time for this purpose, is in wet weather, which will make them strike root quickly; but if the season be dry, holes should be dug in the ground, at about three feet distance, which must be well watered, previously to setting the cauliflowers. By these means, and also by watering them frequently, during warm weather, the plants will grow rapidly, and produce large flowers in autumn. It sometimes happens that, notwithstanding these precautions, they will not flower till after Michaelmas; in which case they must be dug out, together with the earth at their roots, and set upright in a greenhouse, or other warm place, where the blossoms will increase in size, and be fit for use in winter. But, in order to have cauliflowers in the summer, a different mode of cultivation must be pursued. To effect this, the seed should be sown in the beginning of August, on an old cucumber, or melon-bed, over which a little mould should be sifted, about a quarter of an inch thick; this should be shaded with mats, and occasionally watered, to prevent the sun from injuring the plants. About a month after sowing, they will be fit to "prick out," when they should be set four or five inches apart, either under a south wall, to remain there till spring, or in the places where they are destined to blossom, and covered with glass bells during the severity of winter. Thus, and especially by the latter method, the plants will, in the spring, become firmly rooted, and consequently produce larger blossoms than those which are set in that season.

The cauliflowers planted out at Michaelmas, will blow about three weeks sooner than those set in the spring; nevertheless, it is necessary to make plantations in both seasons, that there may be a constant succession of crops. Care should, at the same time, be taken to set them where they may not be exposed too much to the sun, and also to water them well, which will contribute greatly to their growth: M. BECHSTEIN, a German writer, however, asserts, that they will thrive most luxuriantly in the open fields.—As soon as the blossoms begin to appear, it will be requisite to break off the large leaves, and lay over the flowers, in order to shelter them from the rain, and the scorching heat of the sun, which would otherwise cause them to turn yellow.

As cauliflowers are apt to be damaged by the wind, and sometimes to be blown up by the roots, particularly during the months of March and April, they require to be safely protected from its violence. For such plants, therefore, as blossom early, and have large, close flowers, we would recommend the practice adopted in some parts of England, namely, of allowing some of the most forward ones to remain for seed, and tying them carefully to stakes, to prevent their receiving any injury from the wind. As soon as the pods are full grown, and the seeds have arrived at maturity, the whole stalk must be cut off, and dried, previously to the seeds being rubbed out; as they are liable to be shed, if left upon the plants, till the seed-vessels are dry.

The proper method of dressing cauliflower for the table being sufficiently understood, we shall only add, that among the succulent plants produced in our climate, this doubtless is one of the most nourishing, and likewise the best adapted to tender organs of digestion, especially in valetudinarians and invalids: such persons, however, ought to eat it with the addition of some aromatic spice, such as pounded cardamoms, or caraway—or a small proportion of bread.

CAUSTICS, in medicine, are remedies, the operation of which resembles that of fire; by destroying the texture of the part to which they are applied, and converting it into a substance not unlike burnt flesh.

Those bodies which possess causticity, are, when taken internally, mortal poisons: so powerful is their action, in general (for instance, arsenic), that cautious physicians hesitate to prescribe it, even externally. There are, however, several others, which may be in a great measure divested of this deleterious quality, such as the nitrous acid, or aqua fortis; lunar caustic, or a solution of silver in nitrous acid; common caustic, or pure kali; either of which are daily and successfully used, especially for extirpating fungous flesh, removing warts, &c.—See CAUTERY.

The causticity of bodies depends, principally, on the state of the saline and acid matters which they contain. When the latter are concentrated and attached to the substances with which they are combined, they possess great activity, and are corrosive or caustic. In this manner, both fixed and volatile alkalis, though already caustic, acquire that property in a far greater degree, by being mixed with quick-lime; as this substance deprives them of a portion of unctuous and inflammable matter, and divests them of all their fixed air, which binds and restrains their saline principle.

The late Dr. BLACK, when treating on this subject, observed that the compounds produced by the union of metals with acids, are in general corrosive. Many of them, when applied to the skin, destroy it almost as soon as mineral acids; and some of the most powerful cauteries are made in this way. Others are supposed to be more acrid than the pure acids themselves, and produce apparently more powerful effects, when taken internally. Thus, a person may swallow ten or twelve drops of spirit of salt, without feeling any inconvenience; but the same quantity of acid, previously combined with silver, quicksilver, copper, or regulus of antimony, will throw the whole body into violent disorder, or even prove fatal, if taken in one dose.

Caustics are not at present in general use; they are, however, applied occasionally in abscesses, to produce an orifice, and to give vent to the suppurating matter; as likewise to make issues in parts where incision is difficult, or dangerous, on account of the contiguous blood-vessels.

CAUTERY, a surgical term given to substances which corrode or burn any solid part of the body: they are divided into two classes, *actual*, and *potential*. By the former are understood red-hot instruments, which were much in use among the ancients, and are still employed by several barbarous nations, as their almost only means of curing diseases; but, in the modern practice of Europe, they are seldom resorted to, except for the *firing* of horses and cattle.

Some practitioners, however, cauterize with burning tow, others with cotton, or *moxa* (particularly the inflamed part of a toe, for preventing a fit of the gout); others again with live coals, Spanish wax, pyramidal pieces of linen, &c. But of all actual cauteries, the most expeditious and least painful, is that of strewing on the wound a small quantity of the finest gun-powder, and then setting it on fire; a method which, particularly after the bite of a mad dog, has generally been attended with the happiest effect, while it always renders the operation with the knife unnecessary.

Potential cauteries are those which we have already explained under the head of CAUSTICS. In this place, therefore, we shall only observe, that one of the most effectual methods of cleansing foul, indolent ulcerations, and checking the progress of mortification, especially in the legs, is the cautious application of the following lotion: Take thirty grains of *lunar caustic*, dissolve it in a pint of the purest spring, or twice filtred water. If it produce a burning sensation which continues too long for sustaining the pain in the part affected, wash the ulcer with pure water, and make the solution weaker every time it is applied. Although this, in general, proves an excellent remedy in those cases, yet as it is a powerful caustic, we do not advise an indiscriminate use of it, without consulting professional

sional men.—See Ulcers, and Warts.

CAVADILLA, a plant but little known, though its seeds have long been applied externally to destroy vermin; as they produce a considerable irritation in the skin. Lately, however, the celebrated Schmucker has successfully administered these seeds internally for the same purpose, in the following manner: Half a dram of the powder mixed with honey, was ordered to be taken, on an empty stomach, for five successive mornings; after which he prescribed a brisk laxative. By this treatment, the cavadilla has, by several Continental physicians, been observed to expel the *ver-solitaire*, or *solium*, a species of tape-worm extremely difficult to be removed. It is farther affirmed, that in a variety of cases it uniformly produced that effect.

CAVIAR, a species of food chiefly imported from Russia: it is made of the hard roes of the sturgeon, formed into small cakes, about an inch thick, and three or four inches in breadth; but sometimes the whole is loosely packed up in small kegs. It is prepared by taking all the nerves or strings out of the spawn, washing it in white wine or vinegar, spreading it on a table, then salting and pressing it in a fine bag; after which it is put into a vessel perforated at the bottom, to allow the moisture to run out, if any should remain.

From the latest accounts published by Professor Pallas, in his *Travels into the Southern Provinces of the Russian Empire, in the years* 1793 *and* 1794 (an English translation of which, by the editor of this Encyclopædia, is now in the press), it appears that caviar is made of the following three species of fish, caught in the river Volga and the Caspian sea: 1. *Belugas*, or the great sturgeon, of which there are taken annually 103,500; each fish being worth, upon an average, two rubles and a half, or from six to seven shillings sterling: the roe, or caviar, of 1000 sturgeons weighs 4000 Russian pounds, so that this number yields 414,000 pounds, and the value of each *pood*, or forty pounds, is generally computed at three rubles and a half; 2. The little sturgeon, of which there are taken every year 302,000, yielding 724,800 pounds of the roe; and 3. The *Sevrugas*, or *Acipenser stellatus*, L. the annual produce of which is not less than 1,345,000, caught in the different fisheries; and from which 3,228,000 pounds of caviar are obtained: or from the whole number of 1,750,500 fish, 4,366,800 pounds of caviar.—See also Isinglass.

Pallas observes, that it would be difficult to find in the whole world, a fishery more productive to the natives, and advantageous to government, except that on the banks of Newfoundland. During the long Lent of the Greek Church, and the weekly fast-days, which together are at least four months in the year, this fishery affords the principal food to the whole European part of Russia, and its populous capitals.—No caviar was exported in British vessels till the year 1781, and only 1040 pounds (Russian weight) of that commodity were sent to England in 1782; but the increase of this trade was so rapid, that in the following year, 46,040 lbs.; in 1784, 64,480 lbs.; in 1785 and 1786, above 40,000 lbs.; in 1787, nearly 64,000 lbs.; in 1788, 160,000 lbs.; and in 1789, not less than 450,160 lbs.; but in 1790, only 1000 lbs.; and in 1792, 151,240 lbs. were shipped in English vessels.—The exportation to Italy has also amounted to upwards of 400,000 lbs. during the last-mentioned years, exclusive of about 120,000 lbs. to other countries, and a still larger quantity through the ports of the Black Sea, and that of Azov.

" We have purposely enlarged upon this subject, because we conceive that prolific fish, the sturgeon, or at least some of its species, might be advantageously bred, and propagated in British waters. But an undertaking of such incalculable national importance would claim the vigorous aid of government; and we doubt not that, in more peaceable times, this desirable object will not be considered as visionary or impracticable. At present, the annual value of the sturgeons caught in the waters of Astrakhan, and the Caspian sea, amounts to 1,760,405 Russian rubles; a great part of which is paid in British money, for the articles of isinglass and caviar. These fish proceed in shoals to the mouth, and a considerable way up the current of rivers, without the least apparent diminution of their numbers. As the Persians eat no sturgeon, the fisheries of the Sallian are rented by Russians, who, during the spawning season, take 15,000 large fish in one day with the hook, at the weirs formed across the water: nay, it is remarkable, that if the fishermen be accidentally prevented from working but for a single day, the fish accumulate in such numbers at the weir, as to fill the whole channel, so that the uppermost appear with their backs above water, in a river not less than twenty-eight English feet deep, and sixty fathoms wide. But those injudicious fishermen, after having collected the roes for caviar, and the air-bladders for isinglass, throw the body of the fish into the sea as useless.—See MANURE.

With regard to the physical qualities of caviar, we shall only remark, that it is a nourishing food, and more easily digested than pickled salmon; it somewhat resembles in taste, and nutritive property, the essence of anchovies; though few persons, on first, trial relish its flavour.

CAYENNE PEPPER, one of the most heating and stimulating spices with which we are acquainted. It is said to be the production of a tree growing in South America; according to GUTHRIE, the geographer, in the vale of Arica, but more probably in the Island of Cayenne.

This powerful spice, in a state of powder, has lately become the companion of the table, and is much esteemed for its flavour, and the quality it is supposed to possess, of promoting the digestion of fish, and other articles of strong food. We are, however, of opinion, that such practice is not conducive to health, in general; for, though Cayenne pepper, like high flavoured Indian *soys*, may occasionally assist digestion, we would preferably advise those who stand in need of artificial stimulants, if they value their constitution, to abstain from dishes requiring a vigorous stomach, rather than resort to precarious and destructive means.

Dr. UNZER mentions a preparation of Cayenne pepper, called *chiquetaille*, which is so powerful a caustic, that the smallest portion of it applied to the skin, burns more violently than fire: he advises, therefore, in accidents of this nature, immediately to wash the part affected with brandy, which procures speedy relief.

CEDAR, or the *Pinus Cedrus*, L. a species of the pine-tree, usually called the Cedar of Libanon, is a native of Syria. It is an evergreen of the larger kind, bearing roundish cones, with smooth, erect scales, each fruit about five inches long, and four in circumference. The cedar attains a considerable size, and is said to arrive at a greater age than the oak. It appears to have been introduced into England towards the latter end of the 17th century, and may be easily propagated by seed; as it will grow on a poor sandy soil with a mixture of clay. Plantations of this beautiful tree might conduce to the ornament as well as convenience of domestic life: for the wood of cedar is not subject to the depredations of worms, and is admirably calculated to withstand the effects of moisture: hence attempts have been made to imitate it, by dying inferior wood of a red colour; but the fraud may be easily detected by the smell, as that of the cedar is very aromatic. Beside the numerous articles of the cabinet-maker and joiner, the wood of cedar is also made into moulds for black lead pencils.

There are two other varieties of this tree, namely, the *red* and *white* cedar, both of which are natives of America, and species of the juniper tree. The former has seminal varieties, some trees producing, as they grow up, leaves similar to those of the cypress, while others more resemble those of the juniper. It is a most durable wood, especially for posts, which, when once fixed in the ground, will stand unimpaired for a century. It was formerly in much request in America, for chests and wainscoting; but, its smell being rather disagreeable, it is now almost entirely disused.

The *white cedar*, from its very small cones, resembles the cypress. From its bark are gathered small lumps or grains of dry resin, called *olibanum*, or frankincense. The wood of this tree is much used in America for shingles, and has a sweet smell, not unlike cinnamon. Both these last mentioned varieties delight in a dry sandy soil; and, if planted in England, would add much to the beauty of the country.

CEILING, in architecture, is the top, or roof, of an upper room, made of plaster, laid over laths nailed on the bottom of the joists of the upper room; or, where there is no upper room, on joists made for that purpose, which are therefore called *ceiling-joists*.

Plastered ceilings are in much greater use in England than in any other country of Europe; they are preferable to papered, or other ceilings, as they make a room not only lighter, but also prevent the dust from penetrating through crevices; lessen the noise from above; check the progress of accidental fires; and, during summer, contribute to cool the air.—See MORTAR, and PLASTER of Paris.

CELANDINE. See Horned POPPY.

CELERY, a variety of the *Apium graveolens*, L. originally denominated smallage, or parsley. The root, in its wild state, is thick and fibrous; its bushy stalk attains the height of two or three feet, and bears yellow flowers in August: it grows in ditches and salt-marshes, is fetid, acrid, and noxious; but, when cultivated in dry ground, it is divested of those qualities, and then called CELERY.

There are two remarkable varieties of this vegetable: 1. The *shrubby celery*, which is raised from seed; it should be sown at two or three different times, in order to preserve it the better for use during the season, without running up to seed. The first sowing ought to be in the beginning of March, on a gentle hot-bed; the second towards the end of the same month, in an open spot of light earth, where the plant can enjoy the benefit of the sun; and the third in the latter end of April, or the beginning of May, on a moist soil; where it may be exposed to the morning sun only, but not too near trees, as the wet occasionally dropping from their leaves tends to retard its growth.

Towards the middle of May, some of the roots of the first sowing will be fit to be transplanted into trenches for blanching. These must be cut at the distance of three feet from one another, about eight or ten inches in width, and of the same depth; the mould dug out of them should be equally laid on each side, that it may be ready to draw in again, and to earth up the celery, as it advances in height. As soon as the trenches are made, the plants, having been previously trimmed, and the tops of the long leaves cut off, must be set in the middle of them, about four or five inches apart; care being taken to close the earth well around them, and to water them plentifully, until they have taken new root. When about half grown, the lateral fibrous roots should be carefully removed with a knife, and the earth again placed round the parent root, without burying the hearts. By repeating this operation, as occasion requires, Mr. KIRCHNER, a German gardener, asserts, that he obtained celery roots of an extraordinary size. The last crop should be planted in a drier soil; and, in order to prevent it from rotting in the winter, it will be necessary to cover it, when the frost is severe, with pease-haulm, or some similar substance, which admits the access of air. Care should, however, be taken to remove this covering as soon as the weather becomes milder; for otherwise the celery will be apt to *pipe*, and run to seed. When full blanched, this root will not continue good above three weeks or a month; hence to preserve it, and insure a succession of crops, it is necessary to have, at least six or seven seasons of planting, proportioned to the consumption.

2. The *bulbous celery*, generally called, by gardeners, French CELERIAC, but seldom to be met with in this country: it produces a large, knobby root, of a delicate flavour, and from three to five inches in diameter. This plant is usually sown early in the spring, on hot-beds, and afterwards transplanted into a deep, and well prepared garden soil, at equal distances of ten or twelve inches from each other, where it will thrive rapidly, if it be frequently earthed up, and watered, as it requires constant moisture. — Having been disappointed in obtaining the proper seed for this variety, instead of which, an eminent old botanist, of Covent-garden market, furnished us with that of the common fibrous-rooted, or *shrubby celery*; we are led to believe, that the latter may be *artificially* converted into *bulbous*

bous roots, by adopting the simple expedient before suggested by KIRCHNER. Although we have no decisive proof of this useful conversion, which might be easily applied to the improvement of many other culinary vegetables, yet there appears to be a considerable prospect of a successful result in many of those plants, now vegetating in a garden at Paddington.

When distilled, the seeds of both, the wild and cultivated celery, produce an essential oil. The roots of the former are eaten by sheep and goats, but cows and horses refuse them.—As an article of food, the celery is well known, but is said to be hurtful to persons subject to nervous complaints. It is, however, considered as an excellent antiscorbutic.

The *bulbous* root of celeriac is much esteemed on the Continent, where it is preserved in sand for the winter, and eaten chiefly as salad. For this purpose, it is cut in slices, and soaked a few hours in vinegar: by such simple preparation, it becomes as mellow as a pine-apple, and affords a delicious, and very nourishing repast: hence it is much relished by invalids, or the aged. We doubt, however, whether it deserve the great character it has acquired among the French and Germans, for its bracing and restorative virtues, in cases of general relaxation and nervous debility.

CELLARS, in modern building, are the lowest rooms in a house; their ceilings are usually level with the surface of the ground, on which the house is built. They are also situated under the pavement before it, particularly in streets and squares.

On account of the great utility of cellars in preserving wines, ale, &c. various attempts have been made to prevent the generation of damp and noxious air, in subterraneous places: two of these merit particularly to be noticed. The first is that of M. WESTBECK (*in the Memoirs of the Royal Swedish Academy of the Sciences*), who caused a vaulted cellar to be constructed, without stone or lime: instead of the former, he employed charcoal, placed in the manner of brick-work; and, as a substitute for the latter, he used a cement, consisting of clay, kneaded with charcoal dust. These brittle materials were employed, because they attract no moisture, or acidity, either from the air, or earth; a circumstance which renders them even more durable than stone.

Another method, is that frequently practised in Germany, where the vaults are so constructed, that a canal, or passage of communication, is opened from the cellar to the principal chimney of the house. By this means, the cellars may be continually ventilated, so as to expel the damp and noxious vapours, which are usually collected in them; while the draught of the chimney is, in a considerable degree, promoted.

The dangers arising from the sudden, or frequent inhalation of such air as is often generated in close, and damp cellars, have already been stated; together with the most proper method of obviating its deleterious effects. See AIR, p. 23.

CEMENT, generally signifies any glutinous matter, capable of uniting and keeping substances in close cohesion. It principally denotes compositions employed for holding together broken glass, &c. For this purpose, the juice of garlic is recommended as exceedingly proper; for it is very strong; and, if the operation be performed with care, leaves very little or no mark. This is also effected, by a preparation of fresh cheese cut in thin slices, which should be boiled in different waters, and continually stirred: thus it is converted into a very tough and elastic mass, which will not incorporate with liquids. After being sprinkled with a little boiling water, and worked upon a hot stone, a small quantity of unslacked lime should be added, and the whole beat into the consistence of a paste. This composition will prove a strong and durable cement for wood, stone, earthen ware and glass: when thoroughly dry, it resists every effect of water.

There is a cement for joining *glass* and *china*, used in Germany, and which appears to be preferable to that above mentioned. It is prepared as follows: Take, by measure, two parts of litharge, one of unslacked lime, and one of flint glass; let each be separately reduced to the finest powder, and worked up into a paste with old drying oil. Hochheimer asserts, that this compound is very durable, and acquires a greater degree of hardness, when immersed in water.

Another composition, which is successfully employed by the Germans, for cementing *wood*, is prepared from pitch, mixed with bullocks'-blood, linseed-oil, and turpentine. The whole of these must be put over a fire, in an iron pan, and as much brick-dust added as will make them of the consistence of a thin paste. The tub, or cask, to which this preparation is to be applied, must be perfectly dry before it is laid on; and the chinks or crevices filled up with tow, while the cement is warm. Some melt a due portion of colophony with the other liquids, previously to the adding of the brick-dust; by which means the composition is said to be much improved.

Cement, in building, is used to denote any kind of mortar, which is stronger than that usually employed. The cement commonly used, is either *cold* or *hot*. The former is the second above described, for cementing china, &c. which is sometimes, though seldom, resorted to in the erection of walls.

The *hot* cement, in general use, is made of resin, bees-wax, brick-dust, and chalk, boiled together. The bricks to be conjoined are heated, and rubbed together, with cement between them. If the assertion of foreign writers be well-founded, there is a much superior composition for cementing stones prepared on the Continent. It consists of eight parts of pitch, four of colophony, two of minium, or very fine litharge; two of white lead; and one of brick-dust, melted together. Sometimes, however, the following materials are substituted for those last mentioned: Take pure quartz, reduce it to a fine powder, by means of the same freestone, to which it is to be applied; add one third part of unslacked lime, and work the whole into a paste with the whites of eggs, just before it is wanted. So effectual is this preparation, that in a few minutes it will acquire the compactness and solidity of iron.

A cement of tolerable firmness may be obtained, by a mixture of gypsum and quick-lime, with the addition of water: this compound may prove of considerable service in making troughs for holding water, or lining small canals.

A cheap mortar, or cement, that will not crack, may also be procured, according to M. Wiegleb, by mixing three parts of the thin residuum after slacking the lime, with one of powdered gypsum; but he adds, that it can be used only in dry situations.

A peculiar kind of cement is prepared at Madras, with which most of the buildings erected in that Indian capital, are cemented. It consists of sand and lime, with the addition only of a small quantity of water, in which a proportion of coarse sugar has been previously dissolved. The quick-setting of this mortar, and the great hardness it acquires, can, as Dr. James Anderson has observed (in his *Recreations in Agriculture*, vol. i.), only be attributed to one of these two causes, namely, either the sugar added, or the quality of the lime-stone employed at Madras.—There are some kinds of lime-stone in Britain, which afford a much better mortar than others; and this also may be the case in India. Most calcareous earths are blended with sand and other particles, in various proportions; the quality of the mortar or cement will consequently vary, according to the nature of these different ingredients.

It has lately been discovered, that the scrapings of certain roads, consisting chiefly of levigated lime-stone, which is impregnated in a greater or less degree with the dung and urine of animals, form an excellent cement. For ordinary walls, these scrapings alone are frequently used; and, according to the account of Mr. Marshall (in his *Rural Economy of Gloucestershire)*, the proportion for the best building is about one part lime to three of those materials, collected from roads composed of lime-stone.

By the ingenuity of speculative men, however, several other modes of forming cements, have been contrived and successfully employed; but the enumeration of these would necessarily lead us to a greater length than our limits will permit. We shall, therefore, only give an account of the principal Patents lately granted for the invention of various cements.

The *first*, is that of Mr. John Worth, chemist, dated the 28th of May 1771, now expired; for a "Preparation, or cement, for the purpose of preserving His Majesty's and other ships and vessels from worms, &c. and for various purposes in agriculture and commerce."—This composition consists of fourteen pounds of powdered or small pieces of resin; twenty-eight of sand, sifted and washed clean from dirt or loam; three and a half of red lead; and one pound and three quarters of oil: the resin must be melted over a moderate fire, the sand and lead gradually put in, and then the oil; care being taken, when they are boiling, to stir them constantly till they become cold, so that the mass may be uniform. When there is occasion to use this cement, the quantity required must be broken into small pieces, and a pound of what is usually denominated by the chemists, *fat oil*, mixed with every twelve pounds of it. As as soon as this is melted, it may be applied to the object intended, either by pouring it on, or by a brush, while boiling. The quantity of oil to be added to the cement must also be increased, or lessened, in proportion as the composition is required to be of a greater or less degree of hardness, or softness.

The *second*, was granted to Dr. Higgins, for his invention of a "Water cement or stucco for building, repairing, and plastering walls, &c." The component parts of this cement, are drift or quarry sand, cleansed by washing, and carefully strained from clay, salts, and calcareous, gypsous, or other grains less hard and durable than quartz; after which it is dried, either in the sun, or on an iron plate in a furnace, in the manner of a sand heat. To this must be added, fourteen pounds of the newest lime-stone that can be procured; and which heats most in slacking, and slacks soonest when duly watered; dissolves in distilled vinegar with the least effervescence; leaves as little as possible of an insoluble residuum, and contains the smallest quantity of clay, gypsous or martial matter. This must be previously sifted in a brass wire sieve, as finely as possible, and slacked, by being repeatedly immersed in, and quickly drawn out of, a butt filled with soft water, till it be made to pass easily through the sieve; rejecting that part of the lime which is too coarse. The patentee directs to continue that process, till as many ounces have been passed through the sieve as there are quarts of water in the butt. The impregnated liquor, must stand in the vessel closely covered up, until it becomes clear, when it should be drawn off through wooden cocks, as fast and as low as the lime subsides; being now fit for use. Dr. Higgins denominates this solution, *the cementing liquor.* Fifty-six pounds of lime, prepared in the same manner as before, are next to be slacked, by gradually sprinkling on it the cementing liquor, in a close and clean place. The slacked part must be immediately sifted, and the lime, if not used instantly, kept in air-tight vessels; care being taken to reject those pieces which do not pass through the sieve. This richer lime, the Doctor calls *purified lime.* Bone-ash is then prepared, by grinding the whitest burnt bones, which must be sifted much finer than that commonly sold for making cupels. The principal materials being thus prepared, fifty-six pounds of the coarser sand, and forty-two of the fine sand, are to be mixed on a large plank of hard wood, placed horizontally, and spread so that it will stand to the height of six inches, with a flat surface on the plank. This must be wetted with the cementing liquor, and whatever superfluous quantities of it will not incorporate with the sand, must flow off the plank. To the wetted sand are to be gradually added fourteen pounds of the purified lime, tempered in the same manner as fine mortar; with this composition are, by degrees, to be mixed fourteen pounds of the bone-ash, and the whole beaten quickly together; as the sooner, and more perfectly these materials are tempered together, and the quicker the cement thus formed is used, the better it will answer the purpose. This Dr. Higgins calls the *water cement coarse-grained*; it is to be applied in building, pointing, plastering, stuccoing, &c. in a similar manner with mortar; the principal difference being, that as cement is shorter, and dries much sooner than mortar, or common stucco, it ought to be worked expeditiously in all cases; and, in stuccoing, should be laid on by sliding the trowel upwards on it; and that the materials used with this cement in building, ought, when it is laid on, to be well moistened with the cementing liquor; which is also to be employed, if necessary, in wetting the cement, or reducing it to a fluid state. When such cement is required to be of the finer sort, ninety-eight pounds of the fine sand are directed to be wetted with the cementing liquor, and tempered with the purified lime and bone-ash in the manner already described; with this only variation, that fifteen pounds of lime are to be used instead of fourteen, if the greatest part of the sand be as fine as Lynn sand. This is called *water cement fine-grained*, and is to be used in giving the last coating to, or finishing, any work intended to imitate the finer grained stones, or stucco; it may, nevertheless, be applied to all the uses of water cement coarse-grained, and in a similar manner. Whenever, for any of the above-mentioned purposes of pointing, building, &c. a coarser grained and cheaper sand is required, fifty-six pounds of the coarsest sand, or of fine rubble well washed, twenty-eight of the coarser, and fourteen pounds of the fine sand, are to be mixed together, and wetted with the cementing liquor, as above directed; to which fourteen pounds, or somewhat less, of the purified lime, and a similar quantity of the bone-ash, are to be added; and the whole tempered together in the manner already mentioned. When the cement is required to be white, colourless sand, lime, and the whitest bone-ash, are to be selected. Grey sand, and grey bone-ash, formed of half-burnt bones, are to be chosen for making the cement grey. Other colours may be obtained, by employing coloured sand, or by mixing the necessary quantity of coloured talc in powder, vitreous or metallic powders, or other durable ingredients, usually employed in making paint. This water cement, whether coarse, or fine grained, may be used in forming artificial stone, by making alternate layers of the cement, and of flint, hard stone, or brick, in the moulds of the intended stone, and by exposing the masses, thus formed, to the open air, in order to harden. When such cement is wanted for water-fences, two-thirds of the prescribed quantity of bone-ash are to be omitted, and an equal proportion of powdered tarras to be substituted: and if the sand be not of the coarsest sort, more tarras must be added, which should not exceed in weight, one-sixth part of the former. When a cement of the finest grain, and in a fluid form, is required, so that it may be applied with a brush, flint-powder, pounded quartz, or other hard, earthy substance, may be used, instead of sand, but in a smaller quantity, and in proportion to the fineness of the flint, or other powder, so that it shall not amount to more than six times, nor less than four times, the weight of the lime. According to the greater, or smaller quantity of lime, the cement will be more or less liable to crack, by quick drying. Where the sand above described, cannot be conveniently procured, or, where it cannot be washed and sorted, that which bears the greatest resemblance to the mixture of coarse and fine sand, may be selected; provided due attention be paid to the quantity of lime, which is to be increased, when the sand is fine, and to be diminished, in proportion to its coarseness. In situations where sand cannot be procured, any durable stony body, or baked earth, grossly powdered, and sorted in a similar manner, may be substituted by measure, but not by weight, unless such gross powder be of the same specific gravity.—Sand may be cleansed from softer, lighter, and less durable matter, and from those particles which are too fine, by various methods, preferable in certain circumstances to that above described.

Water may be found naturally free from fixible gas, selenite, or clay; and may be employed instead of the cementing liquor; in which state, the water will not require so much lime for its preparation. Where stone-lime cannot be procured, chalk-lime, or shell-lime, which approaches nearest to stone-lime, may be substituted, in the manner above directed; with this exception, however, that fourteen pounds and a half of chalk-lime will be necessary, instead of fourteen pounds of stone-lime. The proportion of lime may, without inconvenience, be increased, when the cement, or stucco, is to be applied, where it is not liable to dry quickly: on the contrary, it may be lessened, and the deficiency supplied, with considerable advantage, by causing an additional quantity of the cementing liquor to soak gradually into the work, so that the calcareous matter of this liquor, and the elastic fluid attracted from the atmosphere, may fill and strengthen the workmanship. The powder of almost every well-dried, or burnt, animal matter, may be substituted for bone-ash, and several earthy powders, especially the micaceous, and the metallic, as well as the calcareous ashes of mineral fuel, and the elixated ashes of various vegetables, the earth of which cannot, by burning, be converted into lime, will, in some measure, answer the purposes of bone-ash: in short, the quantity of the latter may be lessened, without injuring the cement, particularly in those circumstances which admit of a diminution of lime, and where the cement is not liable to dry quickly. For inside work, it will be very useful to mix hair with the cement.

The *last* patent, which we shall notice, was granted in November, 1800, to Mr. JOHN BAPTIST DENIZE, chemist, for a cement, applicable to various purposes. The basis of this is *petroleum*, or rock oil, in any form; in which a small portion of sulphur is dissolved, by melting; to which is added any kind of vitrescible, earthy matter, such as clinkers, and *scoriæ*, from iron, or glass furnaces; puzzolane, or any volcanic ashes, &c. These are to be powdered, and stirred into the melted sulphur-oil, till the whole becomes of such a consistence as to be easily spread with a trowel, and does not adhere to the fingers, when cool. This cement is firm, durable, and impervious to moisture.

Those of our readers, who may be desirous of additional information, relative to this interesting subject, we refer to the translation of M. LORIOT's "*Practical Essay on Cement and Artificial Stone*," (8vo. 1s. 6d. Cadell, 1774); and to Dr. HIGGINS's "*Experiments*

ments and Observations, made with a view of Improving the Art of Composing and Applying Calcareous Cements, and of preparing Quick-Lime, &c. (8vo. 5s. Cadell, 1780); in which the matter is fully and ingeniously discussed. See MORTAR.

CEPHALIC, generally signifies whatever relates to the head. Hence those remedies that are given for disorders of that part, are denominated *cephalic medicines.* Under this description are comprehended cordials, and whatever tends to promote a free circulation of the blood through the brain: thus cephalic snuff is taken with a view to remove pains in the head, by occasioning the patient to sneeze, and, in this manner, perhaps, giving vent to obstructions in the smaller vessels. Such is the imperfect theory of cephalic medicines; and, strictly speaking, we are possessed of no *specific* remedy for relieving a common head-ach, unless the cause from which it proceed, can be ascertained. Of the multiplicity of circumstances which may operate, to produce that complaint, and likewise of the most proper means of alleviating it, we shall endeavour to convince the reader, under the article HEAD-ACH.

Cerussa. See White LEAD.

CHADLOCK. See CHARLOCK.

CHAFER, COCK-CHAFER, May-beetle, Jeffry Cock, or, in Norfolk, DOR, the *Scarabæus Melolontha*, L. is an insect belonging to a genus, which comprises eighty-seven species. It has, like all the rest, a pair of cases to its wings, of a reddish, brown colour, sprinkled with a whitish dust, which is easily separated. The necks of these insects are, in some years, covered with a red plate; in others, with a black; but they are distinct varieties. Their fore legs are very short, and thus better calculated for burrowing in the ground, to which they instinctively retreat.

Chafers are well known by the buzzing noise they make, in the evening, when rising in the air; but particularly for the irreparable mischief they occasion to the industrious cultivator; having been found, in some seasons, so numerous, as to consume every vegetable production. These pernicious vermin are generated from eggs, which the females usually deposit, about six inches deep in the ground. Three months after, the inclosed insects begin to break the shells, and crawl forth, in the form of small grubs, or maggots, which feed upon the roots of whatever vegetables they meet with. In this worm state, they continue for more than three or four years, devouring the roots of every plant they approach, and burrowing under the ground with the utmost celerity for food. At length, they exceed a walnut in size, being large, white, thick maggots, with red heads, which are most frequently found in newly turned earth, and are much sought after by every species of birds. When largest, they are an inch and a half long, of a whitish, yellow colour, with bodies composed of twelve segments, or joints, on each side of which there are nine breathing holes, and three red feet. The head is larger in proportion to the body; of a reddish colour, with a forceps, or pincer before, and a semi-circular lip, with which they cut the roots of plants, and suck out their moisture. They have no eyes, but are furnished with two feelers, which serve to direct their motions under ground.

At the expiration of four years, these destructive insects prepare to emerge from their subterraneous abode. About the latter end of autumn, the grubs begin to perceive their transformation approaching; when they bury themselves deeper in the earth, sometimes even six feet below the surface, where they form capacious apartments, the walls of which become very smooth and shining, by the excretions of their bodies. Soon after, they begin to shorten themselves, to swell, and burst their last skin, preparatory to their change into a *chrysalis*. This appears at first to be of a yellowish colour, which gradually heightens, till at length it becomes almost red. Its external figure clearly displays the characters of the future winged insect, all the fore-parts being distinctly seen; while, behind, the animal seems as if wrapped in swaddling clothes.

In this state, the young Cock-chafer, or May-bug, continues for about three months longer; when, towards the beginning of January, the *aurelia* divests itself of all its impediments, and becomes a complete, winged insect. But it has not attained its natural health, strength, and appetite: unlike all other insects, which arrive at their state of perfection as soon as they become flies, the cock-chafer continues feeble and sickly. Its colour is much brighter than in the perfect animal; all its parts are soft, and its voracious nature appears suspended. In this state, it is frequently found, and is erroneously supposed by those who are ignorant of its real history, to be an old one, of the former season, which has buried itself during the winter, in order to re-visit the sun, the ensuing summer. The fact is, the old one never survives the season, but perishes, in the same manner as every other species of insects, from the severity of the cold, during winter.

Towards the latter end of May, these insects burst from the earth, the first mild evening that invites them abroad; after having lived from four to five years under ground. They are then seen to emerge from their close confinement, no longer to live on roots, and imbibe only the moisture of the earth, but to choose the sweetest vegetables for their food, and to sip the evening dew. An attentive observer will, at that time of the year, see every path-way strewed with them; and, in warm evenings of May, myriads of them are buzzing along, flapping against every thing that impedes their flight. The heat of the mid-day sun, however, seems to be too powerful for their constitution; they, therefore, conceal themselves in clusters, under the foliage of shady trees, but particularly of the willow, which appears to be their most favourite food, and which they seldom quit, till they have consumed all its verdure. In seasons favourable to their propagation, they are seen in an evening, in considerable swarms; their duration, however, is but short, as they never survive the summer. They begin to pair, soon after they have emerged from their subterraneous prison; and the female then carefully bores a hole in the ground, with an instrument for that purpose, with which she is furnished at her tail, and deposits her eggs there, generally to the number of sixty.

Destructive as these insects, in their worm state, are to vegetation, they would be still more so, were they not destroyed by birds, and more especially *rooks*, which devour them in great numbers. Half a century ago, they were so exceedingly numerous in the county of Norfolk, that they destroyed not only the verdure of the fields, but even the roots of vegetables. One farmer, in particular, was so much injured by them, in the year 1751, that he was unable to pay his rent. Many crops in that county, were then almost ruined by the devastations these insects committed, in their worm state; and, when they took wing the next season, trees and hedges were, in many parishes, completely stripped of their leaves. At first, the people brushed them down with poles, swept them up, and burnt them. James Ebden, a Norfolk farmer, made oath, that he gathered *eighty bushels*; but their number did not seem much diminished, except in his own fields. Neither the severest frosts in our climate, nor even water, will kill them; as, on being exposed to the sun and air, for a few hours, they will recover, and resume their former lively state. One of the best methods to be adopted for preventing their transformation, is, to plough up the land in thin furrows, to employ children to pack them up in baskets; and then to strew salt and quick-lime on the ground, and harrow it in.

We have but an imperfect knowledge of the nature and history of the insect, called by the French *Vinaigrieur*, and of other *scarabivorous* animals, to avail ourselves of their labours. This, however, is clear, that if such insects as devour grubs, should take possession of the soil where cock-chafers abound, they must, in a short time, destroy immense numbers of the latter; and as they have five successive seasons to prey on them, till they attain their perfect state, they may be entirely extirpated, before one fly can be produced.

It is a circumstance well known, that the whole of the *corvus*, or crow, and pie-tribes, are exceedingly fond of chafers, and particularly at a season when grain is scarce (*i. e.* from the end of seed-time to the beginning of harvest); they search for them with the utmost avidity. These sagacious birds, having observed that the leaves of such plants as are attacked by the grub, appear withered or drooping, during the day, they fly to them, dig for it with their strong bills, to the very root; and, if they do not find it, pull the plant itself out of the ground. It also frequently happens, that they mistake the drooping leaves of plants newly set, for those injured by grubs, and seize upon these; thus finding no prey, they strike their bills into the ground, at their roots, pull them up one after another, and, if not watched, do great mischief. Strawberries are particularly liable to the depredations of the grub; hence, sometimes, whole fields of strawberry-plants are spoiled by the rooks, immediately after they have been set. To prevent such devastation, it is necessary to guard them, till their leaves assume an upright position.

This damage, however, is but trivial, when compared with the real benefit occasioned by the rooks picking these vermin out of both, grass and corn land. Great care ought, therefore, to be taken not to disturb these birds, especially as in fallowed lands, where grubs generally abound, they are of infinite service. In this case, the land should be stirred with the plough as often as the weather will permit; for, if the rooks once find their way thither, they will not abandon the plough, unless driven away by violence; and each time the land is stirred, they will destroy multitudes of these vermin. Were this the only advantage to be derived from their destruction, it would amply compensate the farmer for the labour and expence bestowed upon it. Independently of the beneficial effect, which this management produces on the fertility of fallow-land, it may frequently be attended with the destruction of a whole race of grubs, in the adjacent fields.

But, as this method is impracticable in gardens, recourse ought to be had to other expedients. Gardeners have observed that cabbages, cauliflowers, strawberries, and especially lettuces, are the favourite food of the grub. In order to destroy that pernicious insect, they plant a row of lettuces between the rows of strawberries, in which case the insect will preferably attack the former. Hence, they carefully examine the plants every day, walking along the rows with a trowel; wherever they observe leaves falling, they know their enemy is on the spot; immediately dig it up, and thus destroy the grub.

The whole race of these insects may probably be extirpated in stiff soils, by long continued rains, during the winter. For at that time, they having descended deep into the ground, the passage must be in some measure left open, so as to allow the water, if in abundance, to soak down to the bottom of their hole; which, in a retentive soil, it will fill, and, if continued a sufficient time, infallibly drown them. Wherever irrigation is employed for other purposes, the extermination of the grub may be effected by this method; and there are many situations, in which water may be commanded in quantities adequate to this important purpose. It is highly probable that, if a stream of water could be spread over the surface of a grass-field, only for a few days, during any of the winter or spring months, all the grubs might be drowned in their holes: and as water is most abundant in that season, a very small stream might be so conducted, in different directions, as to inundate a large tract of ground. The benefit of one irrigation, thus managed, would be felt for five years. We therefore venture, with Dr. Anderson, to recommend this mode of destroying grubs, to those who have grass-lands infested with them; especially when they are intended to be converted into corn-land; for the injury done by grubs to the first crop, is often severely felt. It might even be safely applied to orchards, and wood-lands, provided that the water were not continued longer than is necessary to effect the destruction of the worms.

Having thus given a succinct analysis of the different methods of exterminating the cock-chafer, in its earlier stages of existence, suggested by native writers, we proceed to lay before our readers the latest discoveries made on the Continent, relative to this important subject.

The Hamburgh Society for the Encouragement of the Arts and Useful Trades, has published the following methods of destroying this voracious insect, as communicated by different authors :

1. In order to prevent the worm from changing into a chafer, it is advisable to intersect the fields with ditches : as this insect is continually creeping about, it penetrates through the sides of those trenches, falls into the water which they generally contain, and cannot extricate itself from that situation ; but it is necessary to collect the worms every day ; for they will serve as an excellent food for swine and poultry.

2. Take two ounces of oil (it is not stated what kind of oil) to every pailful of water, and sprinkle it on such places as are visited by the worm : or bury twenty small pots, at equal distances, from 8 to 10 inches deep, and each containing from 20 to 30 drops of sulphurated oil, or thick balsam of sulphur, the exhalation of which expels the insects.—This expedient, however, can be practised only in gardens.

3. Another correspondent suggests the frequent hoeing of plants, or ploughing of the soil in the months of June and July, in order to bruise the insect, or to expose it for the prey of birds. He also advises to pour boiling water on those less productive, or barren spots of meadows, which may be easily distinguished from others : this remedy, however, appears to us exceptionable ; because *hot* water would at the same time injure the vegetating roots of grasses.

4. Previous to a shower of rain, the following powder strewed on the land has been found of great service : namely, two parts of pulverized quick-lime, two parts of sifted wood-ashes, and one part of pounded sulphur : the hepatic vapour disengaged from this mixture, on being moistened, is affirmed to be effectual in destroying that pernicious grub.

5. The Rev. J. F. Mayer, an aged German clergyman, has, in a separate essay on this subject (1786) published the following method of extirpating the cock-chafer : he found from long experience, that irrigation of the fields towards the latter end of May, or in June ; alternate manuring of land with marl, street-dung, acrid and corrosive matters, such as quick-lime, gypsum, nitre, the ley of wood-ashes, and of tanners' waste, &c. are the only practicable means of destroying that insect in a grub-state ; besides which, he advises to drive a flock of sheep frequently over such land as has been much perforated by this insect ; to water the meadows in spring ; to sow red clover early in March, or (in Germany), as soon as the snow is melted on the soil ; then to harrow in the seed ; to cover it thinly with a mellow dung, and to repeat the sowing in the first three or four years, as occasion may require.

In the Memoirs of the Agricultural Society of Paris (for 1787, vol. iii.) the Marquis de Gouffier has suggested a very simple, but, as he asserts, effectual remedy for preventing the depredations of this injurious grub, and consequently its progressive transformation into a chafer. He observed, namely, that *turf* or *peat ashes*, strewed on the fields, produced that desirable effect.

Uses of the Cock-chafer. Although this numerous and voracious insect is by no means calculated to compensate the hundredth part of the injury it inflicts on vegetables; yet we are inclined to think that, especially in a grub state, it might be more frequently employed for the feeding of poultry, than it is at present. Nor does it appear to us impracticable, to feed and fatten great numbers of swine with these chafers, if they were previously bruised, and mixed with such vegetables chopped, or cut small, as are eagerly eaten by hogs.

We shall farther communicate, to artists, a curious fact lately published by M. Busch, a German writer. He informs us, that an uncommonly beautiful *brown colour*, of a reddish shade, for painting, may be easily obtained from the cock-chafer: this colour is said to be of superior lustre and delicacy to every other water-paint hitherto discovered. The colouring matter is found in the throat and stomach of the winged insect, and probably consists of its food, when changed into chyle. After separating the posterior part of the body, there appears to be a thin, white canal, or duct, which should be carefully opened, the juice oozing out, collected on a fine painter's pencil, and then deposited on a shell. Each chafer affords at least three drops of this juice, which may be employed without any farther preparation; and is not liable to fade, or spoil, by long keeping. The most proper time for performing this operation, is the evening, and before the chafers begin to swarm; because they will then be replete with nourishment.

CHAFF, in husbandry, the husks of the corn separated from the grain, by screening or winnowing it. This term is also applied to the rind of corn, which in grinding it, produces the coarser part of the meal.

By treating corn in a manner similar to that practised by the Tartars with buck-wheat (see pp. 376 and 377), it may be easily deprived of its rind, or, in a manner, *blanched*; and the same effect may be produced by merely steeping it in water, and expressing the starch: but the husky part thus separated, cannot with propriety be called *chaff*, as it is in reality part of the grain. Nor do we think that *cut straw* deserves that appellation; because it is a distinct part, or the stalk of the plant. For this reason, we shall delay the description of its properties, as well as the various machines invented for saving the labour of cutting straw by the hand.

Chaff-Cutter. See Straw-Cutter.

CHAIN, a series of rings, or round pieces of metal linked one into another: it is of various forms and sizes, and applied to different purposes.

Notwithstanding the general utility of this article, for almost every branch of extensive manufactures, we have but lately been furnished with a chain, so constructed as to become an effectual substitute for ropes; and in every respect as pliable, while it is far more durable. The metal rope, or chain, we allude to, is that invented by the ingenious William Hancock, of Birmingham; for which the Society for the Encouragement of Arts, Manufactures, and Commerce, in 1796, liberally granted him a premium of fifty guineas.

This chain is particularly useful in the working of coal, and other mines, wells, &c. The common chains, it is well known, cannot be depended upon, and break in the welded parts, when overstrained. Such dangerous accidents cannot easily happen in the metal ropes, being woven together while cold, out of the strongest iron drawn into wire, about 3-eights of an inch in diameter; and so tempered, that it is almost impossible to find in them a link of inferior quality. HANCOCK's chains will run as flexibly on the pulley as an hempen rope of two inches in diameter, manufactured of the best materials: they have been employed in several large iron works, and with the greatest success. Indeed, they deserve to be generally adopted; as thus a considerable saving would arise in the consumption of that valuable article, hemp; and an important new manufacture might be established, from one of our staple commodities. Viewed in a national light, we cannot but regret that the inventor's situation in life does not enable him to make this article for *ready sale:* we therefore presume to appeal to the statesman, and the patriot.

CHAFFWEED, the Small. See Bastard PIMPERNELL.

CHAIR, in general, an article of furniture contrived for the purpose of relieving the lower extremities from the incumbent weight of the body.

Chairs have been held in great estimation, in all ages and countries. But, instead of recording the flying chairs of the heathen gods and goddesses, or those great arm chairs in which, according to ancient custom, the successful candidates, after election, are carried through towns, by certain corporations in England, we shall confine our account to the plain house-chair. — This useful contrivance, for which we are occasionally ridiculed by the more luxurious Orientals, consists, generally, of a *square* basis, supported by *four* posts, or legs. Although we are no advocates for innovation, and the quadrangular form appears to be the most eligible for strength and steadiness, yet, in this instance, we venture to pronounce that it is not the most proper.

Square seats are liable to many objections, when considered with respect to their influence on the health of the aged, infirm, and especially persons afflicted with the piles, or troubled with *ascarides.* For these, a round, or blunt, triangular form of a chair, resembling the shape of a saddle, would be far preferable, and more conducive to the alleviation of their complaints. The reason is obvious; because the thighs and legs, when compressed, occasion an additional irritation, on a part which is already in a preternatural state of excitement, or, perhaps, subject to chronic inflammation, as is frequently the case in the hemorrhoids. Nor do we advise those patients to accustom themselves to rest upon very soft cushions, or pillows, except such as are tightly stuffed with horse-hair, dry mosses, or chaff. Hence we are of opinion, that the studious, and all those who are engaged in sedentary employments, if they regard their health and convenience, should employ either round, wooden chairs, slightly concave, or such as we have before ventured to suggest.

A Patent, we understand, has lately been granted to Mr. BUT-

LER, of Catherine-street, Strand, for his invention of a *chair-bed*, of peculiar construction: but, as we have not been favoured with its specification, we cannot communicate farther particulars.

SEDAN-CHAIRS are vehicles, supported by poles, for carrying single persons, at short distances in town; and borne by two men. Their number in the metropolis, allowed by act of parliament, is four hundred; and the fare to which the chairmen are legally entitled, ought not to exceed two-thirds of the rate fixed for a hackney-coach, driven to the same distance. See 9 ANN, c. 23, sec. 8; also 10 ANN, c. 19; and 12 GEO. I. c. 12.

CHALDRON, is a dry English measure, generally used for sea-coal, and consisting of 36 bushels, filled up according to the sealed bushel kept at Guildhall, London. On ship-board, 21 chaldrons are allowed to the score; each of which should weigh 2000 pounds: hence a bushel of coals ought to weigh from 56 to 62lb.—See BUSHEL.

CHALK, *Creta*, is a white earth, abounding in Britain, France, Norway, and other parts of Europe, which is said to have been anciently dug chiefly in the island of Crete, whence it has received its name.

This substance is found most plentifully in the county of Kent, in England, on the sides of hills, which the workmen undermine to a certain depth; they then dig a trench at the top, as far distant from the edge as the mining extends at the bottom; then fill the trench with water, which soaks through during the night, when the whole mass falls down. In other parts of the kingdom, it generally lies much deeper in the ground.

Chalk is of two kinds: hard, dry and firm, or soft and unctuous. The former sort is the best calculated for burning into lime; but the latter furnishes the best manure for lands. Both these species, however, are an excellent manure for sandy soils, as they fill up the interstices, or pores, and give the land a degree of consistence, which adapts it for the purposes of vegetation, and totally exterminates that pernicious weed, the corn marygold, or yellow ox-eye, *Chrysanthemum segetum*, L. which abounds particularly in sandy soils. It has a very different effect on clayey ground; for, so far from rendering it more compact (which is too much so already), it insinuates itself into the small pores; and, by raising a fermentation, exposes the clay more to the operations of the frost, rain, sun, and air; by which means its too coherent particles are loosened, and it is reduced to a state of pulverization.

It is, however, a circumstance worthy of remark, that, although the Kentish chalk agrees extremely well with other clayey soils, yet, when laid on those lands in Kent, situated near the pits, it by no means answers the expectations of the farmer. This is probably owing to the Kentish clays partaking in some degree of the nature of chalk, which, therefore, has not so good an effect in Kent, as in other parts of England; the quality of the manure being nearly congenial with the soil. It also deserves to be noticed, that chalk, however excellent it may be in itself, when mixed with dung or any other manure, is so far from ameliorating the soil, that crops to be raised from it, receive no benefit whatever, and it totally loses its invigorating qualities.

Chalk easily imbibes water: hence masses of it are employed for drying precipitates, lakes, earthy powders that have been levigated with water, and other moist preparations. Its domestic uses for cleaning and polishing metallic or glass utensils, are well known; for which purposes it is pounded, and by washing it, cleared from whatever gritty particles it may contain, and then called *whiting*. It is also of considerable service on ship-board, when mixed in the proportion of half an ounce to a gallon of distilled sea-water, which may thus be sweetened, and kept perfectly fresh.

In medicine, chalk is reputed to be one of the most useful absorbents, and in this light only, deserves notice; as the astringent virtues, which some have attributed to it, are utterly unfounded, unless in so far as the earth is saturated with acid, in which combination it forms a saline concrete, that is manifestly astringent. Several years since, a person at Edinburgh pretended to have discovered a specific for curing every kind of those *erythematous* or inflammatory eruptions, which often attend the chronic erysipelas, or the rose, on the legs, merely by applying powdered chalk to the parts affected: and though we have had no experience of this remedy, it does not appear, to us, as proper and safe as *hot flour*, the good effects of which, on such occasions, we have frequently witnessed.

Chalk Lands are thus denominated, from their consisting principally of chalk, with a thin layer of mould, or soil over it. They are well calculated for the growth of barley and wheat, and especially of oats, which will thrive well on any kind of chalky land, however indifferent. It naturally produces a small species of vetch, called the smooth podded tare, or tine tare, *Ervum tetrasperum*, L. together with poppies, May-weed, &c.—Sainfoin, and hop-clover, will also succeed on these lands; and, where they are of the better sort, the hare's-foot trefoil, *Trifolium arvense*, L. will thrive. The best manures for this species of soil are, dung, old rags, and the dung left after folding sheep; a practice which is particularly useful here, and which, we hope, will become more general.

CHALYBEATE, in medicine, is an appellation given to any liquid, as wine or water, impregnated with particles of iron or steel.

Chalybeate medicines operate, like other preparations of iron, both as aperients and as astringents, the only difference being in degree.—They are likewise supposed to differ according to the nature of the acid united with the metal: thus, vegetable acids impart to them a detergent and aperient virtue;—when combined with the vitriolic acid, they operate on the first passages as powerful aperients; the nitrous acid renders them very styptic, and the muriatic produces the same effect, in the highest degree.

The use of chalybeates has, occasionally, been attended with great success, when united with cathartics, especially in cases of *chlorosis*, pains of the stomach, and palpitations of the heart; but we think it our duty to caution the reader against resorting indiscriminately to remedies which are extremely precarious for plethoric, or very irritable constitutions, and sometimes productive of dangerous effects. Hence females, in particular, ought never to take them, without proper advice.

CHAMBER, in building, a part of a lodging, or a partition of an apartment, usually intended for the accommodation of beds. We cannot enter into an explanation of *Privy Chamber*, Chambers of *Justice*, *Commerce*, &c. as these are unconnected with our purpose: hence we shall only observe, that we have already given a few directions for correcting a vitiated atmosphere, particularly that of *bed-chambers* (see AIR, p. 22; and BED-ROOM, p. 211); so that we may conclude this article with a short account of a curious mode of *cooling* the air in rooms, frequently practised by the Germans.

In the hot days of summer, especially in houses exposed to the meridian sun, a capacious vessel filled with cold water is placed in the middle of a room; and a few green branches (or as many as it will hold), of a vigorous lime, birch, or willow-tree, are plunged with their lower ends into the fluid. By this easy expedient, the apartment will, in a short time, be rendered much cooler; as the evaporation of water produces this desirable effect, in sultry weather, without any detriment to health. Besides, there can be no doubt, that the exhalation of green plants, under the influence of the solar rays, greatly tends to *purify* the air; and consequently deserves every attention of persons liable to pulmonary, or other complaints, in which the organs of respiration are affected.

CHAMOMILE, *Anthemis*, L. a genus of plants comprising 21 species: of these, five only are indigenous, the principal of which are the three following:

1. The *nobilis*, or common chamomile, also called sweet-scented, or Roman chamomile, growing in sunny meadows and pastures, most plentifully in Cornwall, and also, in other parts of England. Its creeping stalks shoot forth branches, and these again strike root: the leaves and flowers have a strong, though not ungrateful, aromatic smell, and a bitter, nauseous taste. They afford an essential oil. An infusion of the flowers taken lukewarm, is antispasmodic; and cold, a stomachic. In large quantities, the former is apt to excite vomiting. Dr. WITHERING asserts, that the powdered flowers have cured agues, even when bark had failed, but ought to be taken in considerable doses; we suppose from one to two drams every other hour, to be repeated six or eight times during the remission of the paroxysm. Both the leaves and flowers of the chamomile possess remarkable antiseptic properties, and are therefore used in fomentations, and poultices. From their antispasmodic powers, they are frequently found to relieve pain, especially in complaints of the kidneys, and in childbed.

2. The *Cotula*, fetid chamomile, May-weed, or Mathen; which grows in corn-fields, on road sides, and borders of dung-hills: it is a troublesome weed in tilled lands, very ungrateful and disagreeable to bees, and not relished by either horses, cows, sheep, goats, or swine; but toads are said to be fond of it. By its uncommon acrimony, it frequently blisters the skin of reapers. Notwithstanding

its very pungent taste, it has often been used with advantage in diseases peculiar to females.—BECHSTEIN.

In dying, a decoction of the whole plant, when in flower, imparted a *permanent* citron colour to wool prepared in a solution of bismuth.—DAMBOURNEY.

3. The *tinctoria*, or ox-eye chamomile, grows on high sunny pastures, but is rarely to be met with in Britain. Mr. DICKSON found it in Essex. Formerly, it was discovered by RAY, on a bank near the river Tees, not far from Sugburn, Durham. This plant has doubly winged, serrated leaves, cottony underneath, and its stem supports a *corymbus*, or flowers progressively standing each on a proper fruitstalk; attains the height of about eighteen inches; spreads out its branches; and bears yellow blossoms in July and August. It is eaten by horses and goats; but not fondly by sheep, and refused by cows and swine.

The flowers of the yellow ox-eye afford a remarkably clear and good yellow dye.—WITHERING.—If the root of nettles and a little alum be boiled together with this plant, a most beautiful yellow may be given to wool.—LINNÆUS.—None of these colours, however, is permanent.—DAMBOURNEY.

CHAMOMILE, the Wild. See Common FEVERFEW.

CHARCOAL, or *Carbon* of the French chemists, a sort of artificial coal, or fuel, consisting of half-burnt wood. It is chiefly used, where a clear and strong fire without smoke is required; for the humidity of the wood is dissipated by the fire in which it was prepared.

The art of making charcoal is very ancient; for even SOLOMON (Proverb xxvi. 21), distinguishes, that kind of fuel from common firewood. Among the Romans, it was held in great estimation, and ÆMILIUS SCAURUS, the conqueror of the Ligurians, was a charcoal-merchant. PLINY describes the piles of wood erected by the manufacturers of this article, and observes that the blocks ought to be placed in a pyramidal form, coated with clay, and a hole left on the top for conducting the smoke, when the wood is set on fire. Thus, it would be unnecessary to describe the process, for those who employ themselves in the preparation of this article.

Properties. A surprizing number of pores have, by the microscope, been discovered in charcoal. Dr. HOOK counted, in the 18th part of an inch, 150, so that in a piece of an inch in diameter, there will be upwards of five millions. To this circumstance must be ascribed the blackness of charcoal, as the rays of light striking on it, are received and absorbed by its pores, instead of being reflected; consequently, the body of coal appears black,—a colour arising from the want of reflection.

Charcoal may be preserved to an indefinite length of time, and in the ancient tombs of northern nations, entire pieces are frequently discovered. It is, therefore, deserving the attention of those, who wish to preserve valuable records from the "destructive tooth of time;" for there yet exists, according to DODART, charcoal made of corn (probably in the days of CÆSAR), which is in so complete a state, that the wheat may be distinguished from the rye.

This substance is not soluble in any of the acids, but may be dissolved in considerable quantities, by plunging it in a solution of the liver of sulphur, to which it imparts a green colour. Melted with colourless frits, or glasses, it gives a pale, dark yellow, reddish, brownish, or blackish colour, accordingly as the inflammable matter is in greater or less proportion. Fresh charcoal made of wood strongly attracts the air, and will absorb it for a considerable time; but Dr. PRIESTLEY uniformly observed, that, after submitting it to distillation, the expelled air was less pure than that of the atmosphere, and part of it was *fixed air*. Hence it may occasionally be employed in a *dry* and *powdered* state, for damp and foul habitations. Lastly, Dr. PRIESTLEY has discovered that several of the metals, such as copper, iron, silver, &c. may be converted into charcoal, by passing the steam of either spirit of wine or turpentine, over them when red hot; and this, by way of distinction, he calls the *charcoal of metals*. As charcoal has been separated from the purest spirit of wine in the process of making æther, M. LAVOISIER is of opinion, that it is one of the constituent parts, or elements, of that volatile liquid.

Uses. Besides the great advantage which charcoal affords to the artist and manufacturer, it has lately been employed with considerable success. 1. In correcting the burnt or empyreumatic taste of ardent spirits; 2. In depriving rancid oil of its disagreeable flavour; and 3. In restoring putrid meat. For these useful purposes, however, it is fit only when kept in close vessels, immediately after it has been prepared, so that it may absorb no acidity, or fixed air, from the common atmosphere. When employed in the two first-mentioned cases, it should be previously reduced to powder, a very large quantity of which is required for the rectification of distilled liquor; but a smaller proportion, for purifying animal or vegetable oil, so that even the common train-oil may be rendered fit for being burnt in chamber-lamps. Several manufactories of this description have lately been established in the vicinity of London, of which we shall only mention that carried on by Mr. JOSHUA COLLIER, of Southwark.

From the great attraction which charcoal possesses for any kind of oily matter, or for that invisible something, formerly called *phlogiston*, it is excellently adapted to become an extensively useful agent in various branches of the arts. We shall therefore communicate the following abstract of the late discoveries made on this subject, chiefly by Prof. LOWITZ, of St. Petersburgh. This philosopher found, that charcoal rendered the crystals of tartar very white and pure, when employed in preparing them; that the marine and nitrous acids are decomposed by being distilled upon it; that the red juices of vegetable fruits are deprived of their colour, without losing part of their acidity; that brown, rancid oils are rendered sweet and clear, by agitating them for some days with charcoal in powder; that it changes the smell of putrid vegetables to that of a pure volatile alkali, and produces the same effect on fresh meat. By boiling coals in powder, with honey, the pure saccharine parts of the latter are said to be separated, and the honey to become a well-tasted sugar. Vinegar concentrated by freezing, and distilled from a large portion of powdered coal, is extremely strong, pure, and fragrant. Corn-spirit, merely shaken with coal, loses its bad flavour; and, if honey be added, it becomes a sweet and pleasant liquor. Even the tainted flavour of ardent spirits, when impregnated with any vegetable oils, may in a similar manner be destroyed; and, if the spirit be distilled, the residuum is said not to be brown; so that no inconvenience will arise from carrying the distillation too far.—These effects were produced by every kind of coal, whether fossil or charred vegetable substances; though the latter appear to us, in many respects, preferable to coke.

There are considerable differences in the coals of various vegetables, with respect to their habitude to fire: the very light coals of linen, cotton, some fungi, &c. quickly catch fire from a spark, and soon consume: the more dense ones of woods, and roots, are set on fire with greater difficulty, and burn more slowly; the coals of the black berry-bearing alder, of the hazel, willow, and lime-tree, are the most proper for making gunpowder, and other pyrotechnical compositions. For the reduction of metallic calces, those of heavier wood, as oak and beech, are preferable; because these appear to contain a larger proportion of the inflammable principle, and perhaps in a more fixed state. Considered as common fuel, those of the heavy woods afford the greatest heat, and require a most abundant supply of air, in order to keep them burning; on the contrary, the coals of the light woods retain a glowing heat, till they are consumed, without a strong draught of air; the bark usually crackles while burning, which is seldom the case with the coal of the wood itself.

Charcoal is likewise of considerable service to different artists, for polishing brass and copper-plates, after they have been rubbed clean with powdered pumice-stone. Horn-plates may be polished in a similar manner, and a gloss afterwards given them with tripoli.—Coals of different substances are also used as pigments; hence the bone and ivory-black of the shops. Most paints of this kind are not only incorruptible, but also possess the advantage of a full colour, and work freely in all the forms, where powdery pigments are employed; but they ought to be carefully prepared, by thoroughly burning the substance in a close vessel, and afterwards reducing the coal to a fine powder.—In drawing outlines, the artist avails himself of pieces of charcoal, the marks of which may be easily rubbed out. For this purpose, the smaller branches of a tree, such as the willow and vine, are usually preferred; and which, after being freed from the bark and pith, afford the best drawing pencils. Dr. Lewis remarks, that the shells and stones of fruit yielded coals, so hard that they would with difficulty mark on paper, while those of the kernels of fruit were very soft and mellow. All these experiments must be conducted in proper vessels, closely covered (the barrels of old guns, or pistols, may occasionally serve as substitutes). The Doctor levigated various coals into fine powder, mixed them with gum-water and oil, and applied them as paints, diluted with different degrees of white. When laid on thick, they all appeared of a strong, full black;

nor could it be discerned, that one was of a finer colour than another; but those diluted with white, or spread thin, had a blueish cast.—Horns, and the bones, both of fish and land animals, produced coals more glossy, and of a deeper colour, than vegetables; and which, in general, were so hard that paper could scarcely be stained with them: but silk, wool, leather, blood, and the fleshy parts of animals, yielded soft coals Some of these remarkably differed from others, in colour; that of ivory being superior to all, and doubtless the finest of black produced by fire.

In agriculture, charcoal has, in many parts of France and the Netherlands, been substituted for turf-ashes, as a manure; but M. Raulin is of opinion, that it is attended with pernicious effects on the soil, the vegetables it produces, and the animals that feed upon its productions.

Besides these various purposes to which charcoal is daily applied, it also promises to be of considerable service in medicine; on account of its absorbent and antiseptic properties. (See Breath, p. 335.) From a late account given by Dr. Metzler, an eminent physician in Germany, we learn the following extraordinary fact: The corpse of a person that had been murdered twelve days, was brought before a coroner's inquest; and, contrary to the expectation of the court, there was not the least mark of putrefaction, nor any offensive smell perceptible. On opening the intestines of the abdomen, they were found in an unusually dry state. The cause of this phenomenon was soon discovered; for it appeared in the course of examination, that the body had been kept for the whole time buried in dry coals coarsely pounded, at least twelve inches deep. It was still more remarkable, "that the cartaligenous parts, especially those of the breast, had acquired a degree of softness, resembling that of butter." — We submit the application of this singular property to the discernment of our readers.

With regard to the treatment of persons suffocated by the deleterious vapour of charcoal, we shall in this place only observe, that a body in that unfortunate situation, ought to be without delay exposed to the strongest draught of cold air; all the garments loosened; volatile spirits held to the nostrils; the body rubbed either with vinegar, or with a diluted spirit of sal ammoniac; the face should be turned towards the ground, and the head, breast, back, &c. either washed with, or the whole body suddenly plunged into, cold water; then dried, and again washed with vinegar; stimulating clysters repeatedly administered, and venesection performed at the jugular vein, or, for want of medical assistance, a number of leeches applied to the neck and temples.—Of the particular circumstances connected with this treatment, we propose to give a more detailed account, under the head of Suffocation.

CHARITY is one of the cardinal virtues of mankind, displayed chiefly in the spontaneous habit and disposition of supplying the wants of others, whether with money, counsel, assistance, &c. Pecuniary relief, being generally regarded as the most efficacious, it merits some attention, at a time when we are most inclined to excuse ourselves from affording it to the needy. Hence, we propose to impart a few miscellaneous hints, supplementary to those we have already given, under the articles Alms, and Beggars.

We cannot but reprehend the selfish principle of such modern philanthropists as practise, systematically, the trite, but prevailing, adage, that "charity begins at home." For, though in the dispensation of alms, we may find it, perhaps, altogether impossible to avoid giving charity to some undeserving persons, yet it is a duty incumbent upon every good man, to bestow it at all times, without deeply entering into the merits of the question, and carefully to shun every species of ostentation. It may, indeed, be objected, that the pressure of the times is such as to preclude, in many well-disposed individuals, the ability of contributing their mite towards the relief of distressed objects; having, perhaps, large families to maintain, as well as heavy taxes and poor-rates to defray; yet we venture to reply, that prudence and frugality will always enable them to adjust their domestic economy; so that, after satisfying every natural and legal demand, they may have a small overplus to spare, for the assistance of those who are destitute of human aid.

There are many other objections to the *indiscriminate* giving of charity, which our limits will not permit us to discuss: and though it may appear a bold assertion, yet we pledge ourselves for the truth of it; namely, that it is *chiefly* pride and indolence, or some other equally disgraceful motive, which keeps the one half of the world in a state of ignorance, with respect to the wants, distresses, and sufferings of the other.

CHARLOCK, Wild Mustard, Chadlock, or Corn-Cale, the *Sinapis arvensis*, L. an indigenous plant, which grows in corn and turnip fields. It is a very noxious weed, especially among turnips, to which it bears so great a resemblance, that it is said, instances have occurred, of *hoers* taking up a whole crop of turnips, and leaving the charlock. To obviate this evil, it has been recommended to turn a flock of sheep into a field abound- with this weed; for, during the early period of its growth, they will prefer it to the crop. Some lands are exceedingly liable to be overrun with the charlock, particularly when they have been manured with cow-dung alone, as that is very favourable to its growth. Experienced farmers, in general, are so well convinced of this effect, that they always mix horse-dung with that of cows, for manuring arable land. When barley is infested with charlock, to such a degree as to endanger the crop, that weed has been mowed down with success in the month of May, while in flower; but care should be taken to cut off, at the same time, the tops of the barley leaves. Thus, the latter will shoot up above the weed; and it is a remarkable fact, that *four quarters* of grain have been obtained from such land as, without this expedient, would have been almost unproductive.

The most effectual method of extirpating the charlock is, to sow arable land with grass-seeds, and thus convert it into pasture; because the former never grows where a coat of grass covers the ground.

When this plant arrives at maturity, it produces yellow flowers, and turgid, angular pods, containing seed, which is commonly sold under the name of *Durham mustard seed.*

In Ireland, and the northern parts of Europe, this plant is boiled, and eaten in the same manner as cabbage. It is also relished by cows, goats, and swine; sheep are extremely fond of it; but it is generally refused by horses. Bees derive much nourishment from its flowers.

Instead of being spuriously vended for *Durham mustard*, the seeds of this plant might be rendered more profitable, by expressing the excellent oil with which they abound. This has been attempted with success, in Germany; for we are informed by BECHSTEIN, that he obtained thirty pounds of pure lamp-oil, from one hundred pounds weight of the seed.

CHARLOCK, the *Jointed*, or *White flowered.* See Wild RADISH.

CHARR, the RED, or CASE-CHARR, *Salmo alpinus*, or *umbla minor*, a species of fish but seldom found in British lakes, though abundantly in the colder ones of the Lapland Alps. It delights in clear and pure waters, and rarely wanders into running streams.

According to Mr. PENNANT, the largest and most beautiful of these fish are caught in the lake of Windermere, Westmoreland. It spawns about Michaelmas, and chiefly in the river *Brathay*, which forms a confluence with another, called the *Rowthay*, when both disgorge themselves into the lake. The former has a black rocky bottom; but that of the latter, a bright sand, which is never visited by the charr. These fish are said to be in the highest perfection about May, and to continue so the whole summer; yet are seldom caught after April. In the spawning season, they will take bait, but at no other time, and are commonly caught in breast-nets, about twenty-four fathoms long, and five broad.—They are likewise taken, though in smaller quantities, in lakes or pools at the foot of Mount Snowden, in Wales, where this fish is called *torgoch*, and esteemed a greater delicacy than the trout.

The flesh of the charr is very red, and, when potted, delicious eating; hence, numbers of them are annually sent to London.

CHEESE, a species of solid food, prepared from curdled milk cleared of the whey, and afterwards dried for use. As this article constitutes a material part of domestic consumption, we find in almost every country, one or more places celebrated for the superior quality of their cheese. Hence, we propose to enumerate the principal sorts of this manufacture, both at home and abroad; introducing also an account of the mode in which they are prepared.

I. STILTON CHEESE is produced in the town of that name, in the county of Huntingdon; and from its peculiar richness, and flavour, is sometimes called *English Parmesan.* The process of making it is as follows: the night's cream is put to the morning's milk, with the rennet; when the curd *is come*, it is not broken, as is usually done with other cheese, but taken out whole, and put into a sieve, in order to drain gradually. While draining, it is pressed till it becomes firm and dry; when it is placed in a wooden hoop, or box, made to fit it, as it is so extremely rich, that without this precaution, it would be apt to separate. It is afterwards kept on dry boards, and turned daily, with cloth binders round it, which are tightened as occasion requires. After being taken out of the hoop, the cheese is closely bound with cloths, which are changed every day; till it acquires sufficient firmness to support itself: when these cloths are removed, each cheese is rubbed over daily, for two or three months, with a brush; and, if the weather be damp, or moist, twice a-day: the tops and bottoms are treated in a similar manner every day, even before the cloths are taken off.

Stilton cheese is sometimes made in nets, resembling cabbage-nets; but these are neither so good, nor so richly flavoured, as those prepared in the manner before described.

Although the Stilton farmers are in much repute for their cleanliness, they take but little pains with the rennet; as they, in general, cut small pieces from the *vell*, or *maw*, that are put into the milk; and, being gently agitated with the hand, break, or turn it, so that the curd is easily obtained. We venture, however, to say, that their valuable cheese might be improved, and few broken ones occur, if they would prepare the rennet in the manner adopted in the west of England; namely, by keeping the vell, maw, or *rennet-bag* (as it is differently called), perfectly sweet and fresh; for, if it be in the least degree tainted, the cheese will never acquire a fine flavour. When the vell, or maw, is fit for the purpose, a strong solution of salt should be made, with two quarts of soft, sweet, water, into which are to be introduced sweet briar, rose leaves, and flowers, cinnamon, mace, cloves, and, in short, almost every kind of spice and aromatics, that can be procured. The whole must boil gently, till the liquor is reduced to three pints, and care should be taken that it be not smoked. The spices should next be strained clean, and the liquid, when milk warm, poured upon the vell, or maw. A lemon may then be sliced into it, and the whole stand at rest for a day or two; after which it should be again strained, and bottled. Thus, if well corked, it will keep good for twelve months, or longer, possess a fine aromatic odour, and impart an agreeable flavour to the cheese.

II. Cheshire Cheese is prepared in the following way: The evening's milk is not touched till the next morning, when the cream is taken off, and put to warm in a brass pan, heated with boiling water: one-third part of that milk is heated in a similar manner. The cows being milked early in the morning, the new milk, and that of the preceding night, thus prepared, are poured into a large tub, together with the cream. A piece of rennet, kept in luke-warm water, since the preceding evening, is put into the tub, in order to coagulate the milk; with which, if the cheese is intended to be coloured, a small quantity of *arnotto* (or of an infusion of marigolds, or carrots), is rubbed fine and mixed; the whole is stirred together, and, being covered up warm, allowed to stand about half an hour, or till it is coagulated; when it is first turned over with a bowl, to separate the whey from the curds, and broken soon after into very small particles: the whey being separated, by standing some time, is taken from the curd; which sinks to the bottom, and is then collected into a part of the tub, provided with a slip, or loose board, to cross the diameter of the bottom, for the sole purpose of effecting this separation; on which a board is placed, weighing from 60, to 120 pounds, in order to press out the whey. As soon as it acquires a greater degree of solidity, it is cut into slices, and turned over several times, to extract all the whey, and again pressed with weights: these operations may consume about an hour and a half. It is then taken from the tub, and broken very small by the hand, salted, and put into a cheese vat, the depth of which is enlarged by a tin hoop fitted to the top. The side is then strongly pressed, both by hand, and with a board at the top, well weighted; and wooden skewers are placed round the cheese, at the centre, which are frequently drawn out. It is then shifted out of the vat, a cloth being previously put on the top of it, and reversed on the cloth into another vat, or again into the same, if well scalded, before the cheese be returned to it. The top, or upper part, is next broken by the hand, down to the middle, salted, pressed, weighted, and skewered, as before, till all the whey is extracted. This being done, the cheese is again reversed into another vat, likewise warmed, with a cloth under it, and a tin hoop, or binder, put round the upper edge of the cheese, and within the sides of the vat; the former being previously inclosed in a cloth, and its edges put within the vessel. These various operations are performed from about seven o'clock in the morning till one at noon. The pressing of the cheese requires about eight hours more, as it must be twice turned in the vat, round which thin wire skewers are passed, and shifted occasionally. The next morning it ought to be turned, and pressed again, as likewise at night, and on the succeeding day; about the middle of which it is removed to the salting-room, where the outside is salted, and a cloth binder tied round it. After this process, the cheese is turned twice daily, for six or seven days; then left two or three weeks to dry, during which time, it is once turned, and cleaned every day; and at length deposited in the common cheese-room, on a boarded floor, covered with straw, where it is turned daily, till it acquires sufficient hardness. The room should be of a moderate warmth, but no wind, or draught of air, must be permitted to enter, as this generally cracks the cheese. The outsides, or rinds of them, are sometimes rubbed with butter, or oil, in order to give them a coat.

III. Gloucester Cheese is made of milk immediately from the cow; but which, in summer, is thought too hot, and is, therefore, lowered to the requisite degree of heat, before the rennet is added, by pouring in skim-milk, or, if that will not answer, by the addition of water. As soon as the curd "is come," it is broken with a double cheese knife, and also with the hand, in order to clear it from the whey, which is laded off. The curd, being thus freed from the principal part of the whey, is put into vats, which are set in the press for ten or fifteen minutes, in order to extract all the remaining liquid. It is then turned out of the vats into the cheese tubs again; broken small, and scalded with a pailful of water, lowered with whey, about three parts water to one of whey; and the whole is briskly agitated, the curd and water being equally mixed together. After having stood a few minutes, to let the curd subside, the liquor is poured off; and the former collected into a vat, the surface of which is, when about half full, sprinkled with a little salt, that is worked in among the curd. The vat is then filled up, and the whole mass turned two or three times in it, the edges being pared, and the middle rounded up at each turning. At length, the curd is put into a cloth, and placed in the press, whence it is carried to the shelves, and turned, generally, once a day, till it has acquired a sufficient degree of compactness, to enable it to undergo the operation of washing.

IV. Wiltshire Cheese. The milk which produces this cheese is *run*, as it comes from the cow, or as it happens to be *lowered*, by the small quantity of skim-milk mixed with it. The curd is first broken with the hand and dish, care being taken, in first crushing the curd, to let the whey run off gradually, to prevent its carrying away with it the "*fat*" of the cowl. For thin cheese, the curd is not broken so fine as in Gloucestershire; for thick cheese, it is crushed still finer; and, for what is called *loaves*, it is, in a manner, reduced to atoms. The whey is poured off as it rises, and the curd pressed down. The mass of curd is then *pared down*, three or four times over, in slices about an inch thick, in order to extract all the whey from it, pressed, and scalded in a similar manner to the Gloucester cheese. After separating the whey, the curd is, in some dairies, re-broken, and salted in the *cowl*; while, in others, it is taken warm out of the liquor, and salted in the vat: thin cheeses being placed, with a small handful of salt, in one layer; thick ones, with two small handfuls, in two layers; *loaves*, with two handfuls, in three or four layers; the salt being spread, and rubbed uniformly among the curd. Wiltshire cheese is commonly salted twice in the press, where it remains, in proportion to its thickness; thin cheeses, three or four *meals*; thick ones, four or five; and *loaves*, five or six.

V. Cottenham Cheese. The superiority of this cheese, both in delicacy and flavour, is not ascribed to any particular management of the dairies, but solely to the fragrant nature of the herbage on the commons.

VI. Suffolk, or Skim-Cheese. The curd used in making this cheese, is "broken up" in the whey, which is poured off, as soon as the former has subsided; the remainder, with the curd, being thrown into a coarse strainer, and exposed for cooling, is then pressed as tightly as possible; after which, it is put into a vat, and set in a press, for a few minutes, to discharge the remaining whey. When all the liquid part is drained off, the curd is taken out, again broken as finely as possible, salted, and returned to the press.—In some large dairies, mills are employed for breaking the curd.—This kind of cheese is much used at sea, as being less liable to be affected by the heat of warm climates, than others.

VII. Chedder Cheese is held in high estimation; but its goodness is attributed chiefly to the land on which the cows feed, as

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the method of making it is similar to that pursued throughout Somersetshire, and the adjoining counties.

VIII. Lincolnshire Cheese. By adding the cream of one meal's milk, to that which comes immediately from the cow, excellent cream cheese is made in that county. It is gently pressed two or three times, and turned for a few days, previous to its being sent to market. This cheese is usually eaten while new, with salad, radishes, &c.

Having thus given an account of the principal sorts of cheese produced in this country, we shall likewise enumerate some of the most celebrated kinds prepared on the Continent.

1. The Parmesan Cheese is made of the evening's milk, after having been skimmed in the morning, and at noon, and mixed with that of the morning, which has likewise been previously skimmed at noon. The whole is poured into a copper cauldron, resembling an inverted bell, and suspended on the arm of a lever, so as to be moved off and on the fire, at pleasure. In this, the milk is gradually heated to the temperature of about 120 degrees, when it is removed from the fire. As soon as it has subsided, the rennet, in a small bag, is steeped in it; and, being occasionally squeezed, a sufficient quantity of it soon passes into the milk, which is then well stirred, and left to coagulate. In the course of an hour, the coagulation is completed, when the milk is again put over the fire, and raised to a temperature of about 145 degrees: and, while it is heating, the whole mass is briskly agitated, till the curd separates in small lumps. Part of the whey is then taken out, and a little saffron added to the remainder, in order to colour it. When the curd is thus broken sufficiently small, nearly the whole of the whey is taken out, and two pailfuls of cold water poured in, by which the temperature is lowered, so as to enable the dairy-man to collect the former, by passing a cloth beneath it, and gathering it up at the corners. The curd is then pressed into a frame of wood, resembling a peck-measure without a bottom, placed on a solid table, and covered by a round piece of wood, with a great stone at the top. In the course of the night, it cools, assumes a firm consistence, and the whey drains off. The next day, one side is salted, and on the succeeding day the cheese is turned, and the other side rubbed in a similar manner. This operation is continued for about forty days, when the outer crust of the cheese is pared off, the fresh furface is varnished with linseed oil, the convex side coloured red, and the cheese is fit for use.

2. Green Swiss Cheese appears to possess no other peculiarity than that derived from the fragrant powder of the Common Meliot, or the *Trifolium Melilotus officin.* L., which, however, imparts to it a strong flavour, rather offensive than agreeable to most persons! hence it is not calculated to become a favourite article in this country, though considerable quantities of Swiss cheese are annually imported for the tables of the luxurious.

3. Dutch Cheese is likewise prepared in the manner generally adopted in Cheshire, with this difference, that the Dutch, instead of

rennet, make use of spirit of salt. Hence their cheese not only acquires a sharp saline taste, but is also said to be exempt from the depredations of mites: its rich buttery quality must be ascribed to the luxuriant vegetation in the low countries.

4. Westphalia Cheese. M. Hochheimer, a German author, asserts "that it is preferred in England to the Dutch, Swiss, and even Parmesan cheese." Having had no experience of its taste, we can only give an account of the manner in which it is prepared.

After the cream is removed from the milk, when in a sub-acid state, the latter is placed near a fire, spontaneously to coagulate. The curd is then put into a coarse bag, and loaded with ponderous stones to express the whey: in this dry state, it is rubbed between the hands, and crumbled into an empty, clean milk-vat, where it is suffered to remain from three to eight days, accordingly as the cheese is intended to be strong, or mild. This part of the process is called "skinning," or more properly, *mellowing*; because it undergoes the putrid stage of fermentation, and acquires a coat, or skin, on the top, before it is taken out of the vessel, and kneaded into balls, or cylinders, with the addition of a considerable portion of caraways, salt, and butter; or, occasionally, a small quantity of pounded pepper, and cloves. But, if it be too far advanced in the mellowing process, a third part of fresh curds, likewise crumbled into small pieces, is superadded, to prevent, or correct its putrid tendency. In short, the whole mass requires a powerful hand to form a complete union of parts; for it is very apt to corrupt, when imperfectly kneaded. As the pieces, when moulded, are of small size, not exceeding three or four ounces each, in weight, they soon dry in the open air, and are then fit for use. It is, however, necessary to turn and clean them, as well as to shift their places every day upon a board, in order to promote their maturity. After being nearly dry, they are sometimes (for the palate of epicures) suspended in a wood-fire chimney, by means of a net, for several weeks, or months: and both their taste and flavour, are said to be remarkably improved, whether kept in a dry air, or subjected to the action of smoke.

5. Potatoe-Cheese. There are three varieties of this curious article prepared in Germany: we shall, however, describe only that sort which appears to us the most plausible.—The best mealy potatoes are selected, and half-boiled in steam; as, by bursting, their flavour and efficacy are diminished. When cool, they are peeled, and finely grated, or beat into a pulp with a wooden pestle. Three parts of this soft mass, and two parts of sweet curd, after expressing all its whey, are kneaded together, and allowed to stand two or three days in warm, and four or five days in cold, weather. The mixture is then formed into small pieces, like those of Westphalia cheese, and dried in a similar manner.

But, says M. Hochheimer, if you wish to procure a *more delicious potatoe-cheese*, take only one part of potatoes, and three of the curd made of sheep's milk; let the kneaded mass remain three or four days in a vat, to become mellow; then put a stratum of it, one inch high, into a small firkin; strew a few lilac flowers, or caraways and mace, over it; spread a little fresh butter, about the size of a walnut, over these aromatics; then form another layer, repeat the same mode of seasoning the cheese, and proceed in a similar manner to the top of the vessel. When this cheese has been kept for some days, in a dry, airy place, without being exposed to the sun, it is said to excel in taste the best sort made in Holland; and to possess the additional advantage, that it improves with age, and generates no vermin.—We have had no opportunity of ascertaining the truth of this boasted superiority, and candidly submit the process to the decision of our economical readers.

Preservation of Cheese. Among the various productions of the vegetable kingdom, there are perhaps none better calculated for this purpose, than the following: 1. The leaves of the Yellow Star of Bethlehem, *Ornithogalum luteum*, L.; 2. The Tutsan, or Park-leaves, *Hypericum Androsæmum*, L.; and 3. The tender branches of the common birch tree, *Betula alba*, L.—The two first of which, in particular, have from experience been found to possess considerable antiseptic properties. They ought, however, to be employed only when moderately dry, in which state they should be placed upon, or at the sides of the cheese, in an airy situation. The twigs of the birch are especially useful, in preventing the ravages of mites.

Hard and spoiled Cheese may be restored in the following manner: Take four ounces of pearl-ash, pour sweet white wine over it, till the mixture ceases to effervesce. Filtre the solution, dip into it clean linen cloths, cover the cheese with them, and put the whole into a cool place, or dry cellar. Repeat this process every day, at the same time turning the cheese; and, if necessary, continue it for several weeks: thus, the hardest and most insipid cheese has frequently recovered its former flavour.

Although we have devoted much room, and attention, to this important subject, considered in an economical view, we shall be very concise on the *physical properties* of cheese. This substance, being the coarsest and most viscid part of the milk, is digested with difficulty; and therefore calculated only for the more vigorous stomach of the healthy and laborious. Hence, persons of a delicate organization, as well as the studious and sedentary, ought carefully to abstain from its use; for, when eaten *new*, for instance *cream-cheese*, it is apt to disagree, produce rancid eructations, and impair the digestive organs; when *old*, it has a remarkable tendency to putrify, and taint the breath, even of the healthful. After dinner, a very small quantity of sound, old cheese, may do no injury; but it neither assists the digestion of food, nor produces any additional nutriment, when the vessels already abound with alimentary matter.—Lastly, we advise those who know the value of health, and are enabled to procure more salutary food, never to make a meal upon bread and cheese alone.

CHEESE RENNET, or YELLOW BED-STRAW, *Galium verum*, L. is a native plant growing on the sides of fields and roads. It has a firm, erect, square stem; short branches, terminating in spikes of small yellow blossoms, appearing in July and August.

The flowers of this plant coagulate boiling milk; and it is, we apprehend

prehend erroneously, supposed that the best Cheshire cheese is prepared by their influence. When boiled in alum-water, says Dr. WITHERING, they tinge wool yellow. The roots dye a very fine red, not inferior to madder. They also impart a similar colour to the bones of animals fed upon them. According to the experiments related by SUCCOW, the German chemist, a decoction of the whole plant, when in blossom, on adding vitriol of iron and spirit of salt, produced a fine green colour, which was likewise imparted to wool and silk.

Sheep and goats eat the yellow bed-straw; but it is refused by horses, swine, and cows. In France, the flowers are prescribed in hysteric cases. The juice of the plant has been successfully used in Britain; and, from an account given in the *Edinburgh Medical Commentaries*, it appears to be an efficacious remedy for the cure of scorbutic complaints.

CHELTENHAM WATER, a mineral spring, rising in the town of that name, in Gloucestershire, and celebrated for its medicinal properties.

This spring issues slowly, and in a scanty stream, from a bed of sand, intermixed with blue clay. The well is sunk about six feet deep, and excluded from communicating with the external air: its sides are covered with a yellow ochre, which indicates the nature of the water.

When fresh drawn, Cheltenham water, though tolerably clear, is not perfectly transparent. It becomes more turbid by standing, and produces a small quantity of air-bubbles, emitting a slight, but easily perceptible smell, which increases on the approach of rain, is divested of any briskness, or pungency, but has a brackish, somewhat bitter, and chalybeate taste. Its temperature is, invariably, from 53° to 55 degrees.

The sensible effects produced by this water, when first taken into the stomach, are, generally, a degree of drowsiness, and sometimes head-ach; which, however, dissipate spontaneously, before it operates on the bowels. A moderate dose acts speedily as a cathartic, causes no griping, and leaves no languor: for this reason, and likewise on account of the salutary operation of the chalybeate, and, perhaps, of the carbonic acid, or fixed air, Cheltenham water may, as Dr. SAUNDERS has remarked, be preserved for an indefinite length of time, without being productive of any inconvenience to the body; and the use of it may improve the appetite, strengthen the organs of digestion, and invigorate the whole constitution.

This medicinal spring, when judiciously resorted to, has proved of considerable benefit in a variety of diseases, especially those of the chronic kind; in removing glandular obstructions, particularly such as affect the liver, in the restoration of those persons, whose biliary organs are injured by a long residence in hot climates, and who are suffering under the symptoms, either of excess, or deficiency of bile; and lastly, in dispelling some of the most distressing, and painful cutaneous affections, of the species usually denominated *scorbutic* eruptions.

Cheltenham water ought, however, to be taken with due precaution; for, though its ferruginous ingredient, probably enables the constitution to support, without debility, a longer course of evacuation, than most other medicines of this kind, yet it cannot be used in every case, where a simple chalybeate is indicated. There are constitutions naturally languid, or debilitated by disease, so that they may be materially injured by a long-continued operation on the bowels. These saline waters, nevertheless, possess the peculiar advantage, that they may be used without any preparation. No other medicine is required, during their use, except the occasional addition of crystallized salts, of the same nature, where the water is not sufficiently laxative for costive habits; and likewise the use of the warm bath, particularly in cutaneous disorders.

The season for drinking Cheltenham water, is during the summer months; and, if possible, it should always be taken at the fountain head, and never kept long exposed to the air. It may, however, be cautiously warmed in close vessels, if, in a cold state, it should be offensive to the stomach of the patient.—Different circumstances will necessarily vary the extent of the dose; for which, half a pint of water is generally sufficient; and, if repeated three or four times, at proper intervals during the day, it seldom fails to produce an aperient effect.

Among the separate treatises published on this subject, we believe the most complete, though, perhaps, not the latest, is, Dr. J. SMITH's "*Observations on the use and abuse of the Cheltenham Waters; with remarks on different saline compositions*;" published in 1784.

CHEMISTRY is one of the most important branches of Physics, or Natural Philosophy; and, though not easily defined, we shall attempt the following short analysis: The science of chemistry implies the knowledge of the component parts of bodies, whether animal, vegetable, or mineral; that is, the art of decomposing *compound* substances; re-producing them, if possible; and ascertaining their physical properties, and relations to each other, as well as of determining, with accuracy, the affinity subsisting between *simple* earths, metals, &c.—Others have defined chemistry to signify the study of such phenomena, or properties of bodies, as are discoverable, by variously mixing them, or by exposing them to different degrees of heat, in order to enlarge our knowledge of Nature, and improve the useful arts.—There is no doubt that the changes taking place in bodies, are caused by *motion*, which, particularly by means of *heat*, is infused into, and perpetually agitates, the vast corporeal system. The chemist, therefore, inquires into the *causes* of this motion, and by what means it may be generated, diverted, or checked. But, as these impulsive powers are not within the reach of reason unassisted by the observation of effects obvious to the senses, he endeavours to ascertain their nature, by carefully attending to the different action of bodies, when placed in contact with others, either in a dry or fluid state, or submitted to the operation of *fire*; from which he has discovered, more by accident than design, many hidden processes of Nature.

The extensive utility of chemical science, to a commercial and manufacturing nation, in almost every branch of trade, must be evident to the most superficial observer; for this knowledge essentially contributes to the improvement of all the productions of Nature and Art. Thus, the husbandman, the artisan in general, the brewer, distiller, soap-manufacturer, nay, even the baker, and the cook, may avoid many errors and disappointments, if they are but tolerably acquainted with the first principles of an art, which daily administers to our comforts and necessities.

The history of chemistry is involved in obscurity: HERMES TRISMEGISTUS, a noble Egyptian, who lived 1900 years before the Christian æra, is said to be its inventor; though MOSES, the legislator, probably possessed some knowledge of this captivating science. Previous to the time of ROGER BACON, an English Friar of the 13th century, the whole was involved in mystery, and alchemical jargon. Like a bright star in a dark hemisphere, this genius demonstrated to his superstitious brethren, that, by studying Nature, and reducing her powers within the rules of Art, he could produce effects, which far surpassed the miracles of vaunting magicians, while they dispelled the whole tribe of charms, sorceries, and incantations. Nay, it is admitted, that he invented, but carefully concealed, the composition of gunpowder. But his deluded cotemporaries were not to be rescued from the grossest superstitious notions, till the way had been paved by the reformation of LUTHER; and another luminary arose, who was placed in circumstances more favourable to excite attention, and ensure respect to his doctrines. This was the illustrious HOOK, who laid the foundation of chemical science in Britain. Others, indeed, on the Continent, such as PARACELSUS, VAN HELMONT, and Sir THEODORE MAYERNE, the last of whom afterwards spent thirty years in England, had successfully laboured for the improvement of chemistry; but the first of these was an impudent juggler; and the second, a credulous votary of the Paracelsian system. VAN HELMONT, however, must be allowed to be the original discoverer of *gaseous*, or aëriform bodies; for which discovery he was called a magician, and imprisoned by the dark tribunal of the inquisition.

Dr. HOOK proved, 1. That the air in which we live, move, and breathe, is the universal solvent of all inflammable bodies; 2. That it does not perform this action till the body be first sufficiently heated; 3. That this process of dissolution generates a very great *heat*, or what is called fire; 4. That light is also produced from this action; 5. That these phenomena do not arise from the air itself as an element, but from *that part* of the air which is inherent in it, and is like, if not the *very same*, as that which is fixed in *salt-petre*. Thus we find that the foundation was laid for the subsequent discoveries of BOYLE, MAYOW, and HALES, who first ascertained the exact quantity of air, or an elastic fluid analogous to air, either produced or absorbed by the burning of sulphur, or of candles, or by the respiration of animals. Hence, the last mentioned philosopher compares the air to "a true Proteus, now fixed, now volatile, entering into the composition of bodies, where it exists in a solid form, deprived of elasticity, and of those properties which formerly distinguished it, adding gravity to these bodies, and under certain circumstances, alone capable of recovering its elasticity, and becoming again an elastic, thin fluid, and therefore well deserving to be adopted among chemical principles, and to possess a rank which has hitherto been denied it." In his admirable work, entitled *Vegetable Statics*, we perceive the first traces of the existence of air in those waters called *acidulous*; and he not only remarked that they contain four or five times more air than common water, but also conjectured, that they owed to it their sparkling and briskness. The truth and practical application of this discovery to medical purposes, were vigorously enforced by the immortal BOERHAAVE, whose reputation, both as a physician and a philosopher (two great qualifications, not always united), had resounded to the remotest parts of the globe.—Previous to his time, the illustrious BECHER first began to collect and compare the immense store of chemical facts, and arrange their relations towards a new system. Persecuted and despised, like most benefactors of mankind who forsake the beaten track, he fled from his native country, retired to England, and died of a broken heart at London in 1682. His theory, however, was adopted by the sagacious and intrepid STAHL, then first physician to the King of Prussia. In the opinion of these two authors, *fire* enters into the composition of all inflammable bodies, into metals, and most minerals; and in that condensed and fixed state, they called it *phlogiston*, or latent fire, to distinguish it from its condition, when in a free state. They farther believed that phlogiston is actually a material body, liable to be modified and influenced by circumstances; and that consequently *all* metals were compounds; and water, as containing no phlogiston, a simple body. Although this vague theory has been strenuously maintained by nearly all the chemists of Europe, for upwards of a century, and is still supported by Dr. PRIESTLEY, and many of his followers in this and other countries, yet, to the honour of our age, and we venture to say, the credit of that voluntary exile, the doctrine of phlogiston is nearly exploded. To proceed in this explanation, according to the order of time in which the leading facts were ascertained, we shall first mention, that Dr. BLACK, our late illustrious professor of chemistry, in the University of Edinburgh, about the middle of last century observed, that certain substances, such as marble, chalk, and limestone, when submitted to the process of fire, lost half their former weight; and, when treated with acids, the compound weighed less than before. Hence, it became evident, that *something* was lost; and, from a strict chemical analysis, he proved this something to be a permanently elastic fluid, which he termed *fixed air*—deprived of which, the residue was caustic, or *quick-lime*, capable of corroding all animal and vegetable substances. Hitherto, the existence of fixed air, and its combination with bodies, was only conjectured, and no philosopher, since VAN HELMONT's time, had adopted this opinion. Thus, new views were opened in the examination of all matter, and the attention of experimental inquirers was principally directed to the decomposition of solid bodies. Dr. RUTHERFORD extended

extended this inquiry, and determined the difference between fixed and *azotic* air, another species of suffocative gas, which cannot be respired by animals, nor is it miscible with water, and therefore by some called mephitic, or phlogisticated air. This azotic air constitutes about seventy-two parts in the hundred of the common atmosphere, and therefore deserves particular attention: it was discovered by Dr. PRIESTLEY, and arises from the changes which atmospheric air undergoes in every process of combustion, putrefaction, and respiration; in short, it is of the same nature as that contained in the air-bladder of the carp, and other fish. Being much lighter than the air of the atmosphere, the azote instantly extinguishes burning tapers, and rapidly destroys the life of animals immersed in it.

The most splendid and important discovery of Dr. PRIESTLEY, however, is that of *vital air*, or oxygen, to which he was accidentally led, in August 1774, and which will transmit his name to posterity. This aerial fluid, which he denominates *dephlogisticated air*, because he supposed it to be deprived of all its phlogiston, also forms a considerable part of our atmosphere, so that it has been ascertained, by experiment, to exist there in the proportion of about 27 or 28 parts in 100. Thus, the composition of that boundless element in which we breathe and move, was, at length, discovered, and though BERGMANN and SCHEELE, in Sweden, as well as LAVOISIER, in France, claimed an equal or coeval merit with Dr. PRIESTLEY, having, about the same period, in their experimental researches on this subject, observed similar phenomena; yet, we believe, the last mentioned philosopher is justly entitled to the honour of being called the author of this great discovery. The manner in which it was made, is foreign to our purpose; and we shall therefore briefly state, that the ingenious and noble LAVOISIER, who fell a sacrifice to the ambition and tyranny of Robespierre, of infamous memory, established a new and more plausible system of chemistry upon the ground-work of this contested discovery, by which the component parts of the atmosphere were clearly and indubitably determined. In contradistinction to the exploded doctrine of phlogiston, the theory adopted by LAVOISIER, and supported by BERTHOLLET, MORVEAU, ADET, HASSENFRATZ, DE LA PLACE, MONGE, CHAPTAL, FOURCROY, and others, was now termed the *Antiphlogistic System*. The principal feature of the new French system is, that the air is a *compound* body, and that metals, in general, are *simple* substances. We cannot, in this place, enter into farther particulars; and therefore only recommend to the juvenile reader, the perusal and study of such elementary works as afford a plain and accurate explanation of that admirable and highly useful science; without a competent knowledge of which, he will ever remain in a state of infancy, at least with respect to the numberless phenomena taking place in the physical world. We regret, however, that a publication calculated completely to answer the expectations of an ordinary reader, is still a *desideratum*; though there have been published within the last twenty years, a great variety of instructive books on this subject.

The principal difficulty appears to arise from the unsettled state of chemical nomenclature, which has lately been, in a great measure, removed by the praise-worthy labours of Dr. Pearson, Dr. Dickson, and Mr. Parkinson; yet, whatever merit these introductory works may posssess, there is still wanted a concise, perspicuous, and systematic analysis of the science of chemistry, such as could be read, with satisfaction, by every person possessed of ordinary talents. Girtanner and Scherer, in Germany, have attempted such works; but their manuals abound in too abstract propositions, and are written in a dogmatical rather than narrative style, that may tend to entertain the reader, and imperceptibly lead from the more simple to connected propositions. Although it be perfectly consistent with scientific arrangement, to begin the explanation of a system with general truths, and then descend to particulars; yet we incline to think, that the young student, as well as readers in general, would acquire a more correct idea of a subject, by commencing the series of principles with such illustrations, as would render every term, involved in the first definition, perfectly clear and familiar to their understanding. Thus, the immortal Bacon was peculiarly happy in defining *simple* ideas, before he proceeded to reduce them under *general* heads, and draw the inference, or exhibit the result, by the most unequivocal process of induction. Instead, however, of following the footsteps of this mighty genius, most of our modern physical writers, either begin the analysis of the subject with general maxims; or they dissect and divide the whole into *distinct* parts, and fatigue the reader with endless repetition, without affording him a view of the *synthesis*, or conjuncture of members (if that expression be allowed), which alone could enable him to connect the several causes and effects, of which the whole is composed. In justice, however, to Lavoisier, the founder of the new system, we shall observe, that his "*Elements of Chemistry*" possess, in this respect, uncommon merit; though he dwells too long upon the *rationale*, without exemplifying the principles, in such a manner as to impress the mind with sensible objects, which alone can permanently fix the idea, and connect every link of the proposition. We claim the indulgence of our readers, for this involuntary digression; and though we cannot, in truth, exclusively recommend any late work, published in the form of a *popular*, or familiar introduction to chemistry, yet we shall mention several valuable treatises, that have successively appeared, and are entitled to attention. The different translations from the French of Lavoisier, Chaptal, and Fourcroy, and especially that of the last, by Mr. John Thomson, deserves to be read, and diligently studied; that from the German of Professor Gren, is likewise a work of merit, for professional readers; and among the original English works, we shall point out Dr. Higgins's "*View of the Phlogistic and Antiphlogistic Theories*" (8vo. 7s.); Mr. Nicholson's "*First Principles of Chemistry* (8vo. 8s. 6d.); and Dr. Garnett's "*Outlines of Lectures of Chemistry* (8vo. 4s.); besides these, there are several smaller tracts, among which we remember, with satisfaction, the perusal of that written by Mr. Henry, of Manchester.

CHERRY, a species of the *Prunus*, L. or plum-tree, a genus of plants, comprising fifteen species, originally natives of Persia; whence they were introduced into Italy, as well as other parts of Europe; and are supposed to have been brought from Flanders into England, in the reign of Henry the Eighth.—The principal species, growing in our climate are the following:

1. The *Padus*, or bird cherry, or wild cluster cherry, a shrub which flourishes wild, on almost any soil, if not *wet* (Withering); and is found chiefly in hedges and woods. It bears lopping, and does not stifle the growth of grass. Sheep, goats, and swine eat the leaves, but they are not relished by cows, and refused by horses. Its fruit is nauseous; but, when bruised, and infused in wine, or brandy, it imparts an agreeable flavour. Its smooth and tough wood is made into handles for knives and whips. The inner bark is said to afford a fine green colour, on boiling it with alum.

Bechstein observes, that this dwarf tree, when transplanted into a rich soil, attains the height of forty feet, and two feet in diameter; and that it thrives most luxuriantly near hedges and waters. As its abundant white blossoms, in May, present a picturesque view, it deserves to be cultivated on the borders of parks and gardens.—Holmberger, a Swedish author, remarks that the dried kernels of this cherry are equal in taste and flavour to almonds, and yield, on expression, a fine and plentiful oil.—A decoction of the berries is sometimes successfully given in the dysentery.

2. The *Cerasus*, or common wild cherry tree, which is frequently found in woods and hedges, but is probably produced from the stones of the garden-varieties, dropped by birds. It delights in a *sandy* soil, and an elevated situation, and often grows from fifteen to thirty feet in height, but is seldom more than nine inches in diameter. It flowers in the month of May; its sour fruit is eaten by country people, either fresh or dried, and is frequently infused in brandy, on account of its aromatic flavour.

Cherry-trees require to be planted from twenty to thirty feet distant, and to be set deeper in the earth than apple-trees; with the management of which, in other respects, they correspond. Their growth is said to be uncommonly promoted, by laying a composition of lime and night-soil on their young stems, with a brush, which operation has a similar effect on apple-trees.

The best method of raising cherry-trees is, to plant them among hops, in alternate rows with apples, and with two rows of filberts between each; by which means they arrive very speedily at perfection, and thus amply repay the expence and labour bestowed on them at first. The proportion (in the county of Kent, where this species is principally cultivated) is usually, to an acre, 800 hop-hills, 200 filberts, and 40 cherry and apple, trees. The hops will stand about twelve years, and the filberts about thirty, by which time the cherry and apple-trees will occupy the whole land.

This species of the *Prunus* is, according to LINNÆUS, the parent-stock, from which many of the cultivated varieties are derived: there are many different sorts, which are known under the names of Black-heart, White-heart, *Flemish*, or early Kentish, Courone, and Hertfordshire black, Cherries. All these have been raised originally from stones, and afterwards preserved by budding, and grafting on stocks of the wild black and red cherry, reared for this purpose. In order to ensure a luxuriant vegetation, and a delicious flavour, to these varieties, the stones of the black cherries should be set, or sown, in autumn, to raise stocks; and planted out, the second year after they come up, in lines at the distance of about two feet.

Cherry-trees prosper best when grafted; and, exclusive of their delicious fruit, afford, by their plentiful leaves, an excellent article of food for fattening hogs.—They also exude a gum in every respect equal to gum-arabic; and which is so extremely nutritive, that, according to HASSELQUIST, above 100 men were kept alive, during a siege, for nearly two months, with no other sustenance than that produced by gradually dissolving a little of this gum in the mouth.—The wood is hard and tough; it is used by turners in the manufacture of chairs, and stained to imitate mahogany.

From the ripe black cherries of the second species, the Swiss distill a very agreeable *liqueur*, or ardent spirit, by the sale of which, to the French and Germans, they annually derive considerable profit. For *preserving* this fruit during the winter, we communicate the following recipe, inserted in HOCHHEIMER's German work on *Domestic Economy*. — Take, in the proportion of two pounds of sour cherries, half a pound of fine loaf sugar, and a pint of white wine vinegar; boil the two last, and skim off the impurities from the top; then let the liquor stand, till it become lukewarm. Meanwhile, prepare a coarse powder, consisting of two drams of cinnamon, and one of cloves; break the stalks of the cherries in the middle, so as to leave half of their length for the jar, into which they must be carefully put in layers, strewing a little of the spice between each stratum, pouring the liquor above-mentioned on the top, and securing the whole from the access of air.

With respect to their physical effects, cherries may be divided into sweet, sub-acid, and pulpy. The first kind, though the most palatable, are the least wholesome, as they readily ferment, and produce flatulency in weak stomachs; the second are the most antiseptic; and the third, the most nourishing, but digested with some difficulty. Hence we would preferably recommend the sub-acid cherries, as an excellent article of domestic medicine in the true scurvy, in putrid fevers, and the dysentery; as likewise to those persons, who are liable to obstructions in the alimentary canal. With this intention they may be eaten in considerable quantities, and frequently from half a pound to a pound each time, but particularly on an empty stomach. Nor will they be found less salutary to constitutions whose bile is vitiated, whose stomach is troubled with foul eructations, and who are afflicted with an offensive breath: all such persons should eat them freely. For similar reasons, *dried* *cherries* form an excellent article of diet, in acute or inflammatory disorders: where they should be used both in substance, and in decoctions, which are equally cooling and antiseptic.

CHERVIL, or *Chærophyllum*, L. a genus of plants comprising seven species, two of which only are indigenous, namely,

1. The *sylvestre*, or wild chervil, or smooth cow-parsley, or cow-weed chervil, which thrives in hedges, orchards, and pastures. It has a woolly striated stem, erect umbels, and white flowers, which blow in the month of May.

The umbels of this plant afford an indifferent yellow dye; the leaves and stems a beautiful green. Its presence indicates a fruitful soil, but it ought to be eradicated from all pastures early in the spring, as cows, rabbits, and asses, are the only animals that will eat it. LINNÆUS informs us, that the roots, when eaten as parsnips, have been found poisonous; yet, according to Mr. CURTIS, they were in some parts of Britain, during times of scarcity, eaten as a pot-herb.

2. The *temulentum*, rough cow-parsley, or rough chervil, growing in hedges, and bearing flowers in the months of July and August.—It possesses no peculiar properties.

CHERVIL, the GREAT, or Shepherd's Needle, the *Scandix odorata* v. *Cerefolium*. See Sweet CICELY.

CHERVIL, the NEEDLE, or Venus Comb, the *Scandix Pecten*. See Common Shepherd's NEEDLE.

CHESNUT, or *Castanea*, L. is a species of the *Fagus* or beech-tree, a genus of plants comprising three species. It flourishes on poor gravelly or sandy soils, and will thrive in any but moist or marshy situations. Those trees, however, which are intended for fruit, should be raised in nurseries from nuts, removed at least three times, and have the tap-roots cut off, in order to facilitate their growth.

There is no plant cultivated in England that is more valuable than the chesnut; as it grows to a considerable height, and its wood, if kept dry, is extremely durable. This ornament to the country is, at the same time, of great utility for domestic purposes. It excels the oak in two respects, namely, that it grows faster, and that the "sap-parts" of the timber are more firm and less liable to corruption. The shoots from the stubs being numerous and luxuriant, it makes an excellent underwood, and is of great service for hop-poles, as it may be cut when about eighteen or twenty years old, and will continue productive for nearly thirty years. Being greatly superior to elm for door jambs, and several other purposes of house-carpentry, it is considered as nearly equal to the oak itself; but, on account of its possessing a precarious brittleness, which renders it unsafe for beams, it ought not to be employed in any situation, where an uncertain weight is sometimes to be supported.

It has been much questioned, whether the chesnut is indigenous, or exotic. There is no doubt, that it was industriously cultivated by our ancestors; and this circumstance, together with the existence of the celebrated chesnut at Tortworth, in Gloucestershire, has been urged, with great probability, as a proof of its being a native. That stupendous tree is 52 feet in circumference, and has, according to authentic records, stood there ever since the year 1150, when it was so remarkable as to be called "*the Great Chesnut of Tortworth.*" It fixes the boundary of the manor, and is probably not less than 1000 years old. On the contrary, it has been asserted, that from its being called the *Spanish Chesnut*, it is a native of Spain, and was introduced from that country, at some distant period. However the question may be decided, it will be generally admitted that, in this climate, there is no plant which so fully merits the great attention which has of late years been paid to its growth. We, therefore, cordially join in recommending it to those who intend to form plantations, whether for ornament or use, as a tree which for durability, beauty, and stature, will amply, and in a very short time, repay all the labour and expence that may be bestowed upon its culture.

All writers agree that the wood of the chesnut is peculiarly excellent for casks, as it neither shrinks, nor changes the taste, or colour, of the liquor. It is also converted into various articles of furniture, and when stained, may be made to resemble in beauty and colour the finest mahogany: this improvement is effected, by rubbing it over, first with alum water, then laying on with a brush a decoction of logwood-chips; and lastly, a decoction of Brazil-wood. Besides these various uses, to which this tree may be applied, its fruit affords an agreeable addition to our winter dessert. If properly managed, a sweet and nutritious bread may be prepared of it, especially when mixed with a small proportion of wheaten or other flour. In its wild state, it is called the *horse-chesnut*, and, independently of its beauty as an ornamental tree, its mealy nuts supply not only an excellent food for fattening deer and hogs, but are likewise of great service in whitening cloth, and the manufacture of starch. For this latter purpose, a patent was granted to Lord WILLIAM MURRAY, March 8, 1796, of whose process we subjoin the following account. The nuts must be first taken out of the outward green prickly husks, and the brown rind carefully pared off, so as totally to eradicate the sprout, or growth. They are next to be rasped, or grated fine into water, and the pulp thus produced should be washed, as clean as possible, through a hair sieve. This washing is repeated twice through fine sieves, constantly adding pure water, to prevent any starch from adhering to the pulp. The last process is, to strain it with a large quantity of water (about four gallons to a pound of starch) through a fine gauze, muslin, or lawn sieve; in order to clear it entirely of all bran, or other impurities. As soon as it subsides, the water is to be poured off, and the remaining substance mixed up repeatedly with clean water, till the latter becomes perfectly colourless. It should then be drained off till it is nearly dry, and set to bake, either in the usual mode in which starch is baked, or spread out before a brisk fire; care being taken to prevent it from "*horning*," or turning into a paste or jelly; which, as soon as it becomes dry, acquires the solidity and hardness of horn.

We have mentioned the particulars of Lord W. MURRAY's patent, not indeed to induce our readers to encroach upon his exclusive privilege of making starch; but merely for enabling them to compare the above-stated process with the following ingenious, and easy, method of converting *horse-chesnuts* into a *good and wholesome bread:*

M. Laleyrie, a few years since, directed his countrymen, in one of the Paris Journals, first to peel the chesnuts, and to dry them either in the open air, or in a room. When perfectly dry, they should be grated and pounded. The sifted flour is to be passed into a vessel containing water, and there strongly agitated. After standing at rest for an hour, the water is carefully poured off, to prevent the loss of any sediment. This infusion should be repeated eight or nine different times, with a proportionate quantity of water, till the liquor becomes colourless and insipid. The subsided pulp is then fit to be passed into a close linen bag; and, after pressing it, to be slowly dried. The fine floury mass, or starch, thus obtained, will be found free from all bitterness and astringency; it has no longer any disagreeable taste, and affords wholesome nutriment.

Chesnuts, especially the small esculent sort, form an important article of commerce, in Italy, and in the island of Corsica; which latter alone exports annually such quantities as amount in value to 100,000 crowns. The Germans roast them among embers, and eat them with butter and salt; the French, with lemon-juice and sugar, which agrees better with weak stomachs. This leguminous fruit is also employed in several articles of confectionary; as a substitute for coffee, and in the preparation of chocolate.

Although these nuts are palatable, and less oily than most productions of a similar nature, yet, when used in abundance, they are not easy of digestion, and ought therefore to be eaten only by the healthy and robust. To promote their solution and assimilation in the stomach, they require the aid of salt, in a considerable proportion; but the addition of butter renders them still heavier, and tends to retard rather than to accelerate their conversion into alimentary matter.

CHEST, in commerce, a kind of measure, which contains an uncertain quantity of various commodities. Thus, a chest of sugar holds from 10 to 15 cwt.; a chest of glass from 2 to 300 cubic feet; of Castile soap, from $2\frac{1}{2}$ to 3 cwt.; of indigo, from $1\frac{1}{2}$ to 2 cwt.; computed at five score to the hundred.

CHEWING, or mastication, is the action of the teeth, by which solid food is broken, and divided into smaller particles: thus, being at the same time mixed with the saliva, it is better prepared for digestion, both on account of its pulpy state, and the solvent nature of the fluids, secreted by the salival glands, during the exertion of the adjacent muscles. Hence it is obvious, that those persons, who are in the habit of swallowing their meals with expedition, and afterwards inundate the stomach with large potations, do themselves a double injury: 1. Because their food passes through the stomach, only half digested—affording but a scanty supply of real nourishment; and 2. Their saliva is, against the order of Nature, constantly determined to other emunctories, so that it will, sooner or later, produce cutaneous, and painful diseases.

Chewing-Ball for horses, a kind of medicated bolus, for restoring a proper a proper appetite: it is prepared of asafœtida, liver of antimony, bay, or juniper-wood, and the pellitory of Spain; which, after being dried in the sun, and wrapped in a strong linen cloth, are fastened to the bit of the bridle, in order to induce the animal to chew the bag. Such balls, it is said, may also be made of Venice treacle, and successfully used for the same purpose. See *Ball*, p. 152, *Horse-balls.*

Cichory. See White Succory.

CHICK, or CHICKEN, the young of the gallinaceous order of birds, especially of the common hen.

From the importance of this bird, as constituting a delicate and agreeable food, especially to invalids, the means of hatching, and rearing it, have long exercised the ingenuity of speculators. We shall, however, confine our present account to those modes only, which are the most simple, and have been attended with the greatest success.

The manner in which they are hatched in ovens, by the Egyptians, is too well known, to require a detailed description: by this contrivance, six or seven thousand chickens are produced at one time: these, as the spring is uncommonly mild, being indeed much warmer than our summer, will thrive without "*clutching*." Similar success has attended the experiments of M. Reaumur. In order to remedy the severity of a northern climate, that would have otherwise destroyed the chickens as soon as hatched, he resorted to an expedient, which he called "a woollen hen;" namely, he put them in a warm basket, and covered them over carefully with dry animal wool.

Another method of hatching and rearing chickens, we shall extract from the 13th volume of "*Dodsley's Annual Register*" (for 1770, p. 105, Chronicle). It was laid before a learned society, by a gentleman, to whom a gold medal was awarded for his contrivance.—The chickens should be taken away from the hen, the night after they are hatched, and be re-placed with new eggs, on which she will continue to sit, for a second and third brood. When first removed from the hen, they are to be fed for a fortnight with eggs, boiled hard, chopped fine, and mixed with bread, in the same manner as larks and other birds are reared. After this period, they are to be supplied with oatmeal and treacle, so mixed as to crumble; a food of which the chickens are so fond, and thrive so rapidly, that, at the end of two months, they will be as large as full grown fowls.—We apprehend, however, this ingenious method would render the chickens more expensive, than we can purchase them, in the most extravagant London markets: hence it appears to be calculated only for the curious and speculative epicure. See Egg and Hen.

Chickling Vetch. See Vetch.

CHICKWEED, or *Alsine*, L. a genus of plants, comprising five species, of which that most generally known in England is the *media*, or common chickweed.

It grows in almost every situation, whether damp, or even boggy woods, or the driest gravel walks in gardens. In its wild state, this plant frequently exceeds half a yard in height, and varies so much from the garden chickweed, that if a person were acquainted only with the latter, he would with difficulty recognize it in the woods. On account of its upright flowers, which blow from March to October, it may be considered as a natural barometer; for, if they are closed, it is a certain sign of approaching rain; while, during dry weather, they are regularly open, from nine o'clock in the morning till noon.

This species affords a striking instance of what is called the *sleep of plants*. Every night the leaves approach in pairs, so as to include, within their upper surfaces, the tender rudiments of the new shoots: and the uppermost pair, but one, at the end of the stalk, is furnished with longer leaf-stalks than the others, so that it can close upon the terminating pair, and protect the end of the branch.

Swine are extremely fond of chickweed, which is also eaten by cows and horses, but is not relished by sheep, and is refused by goats. It likewise furnishes a grateful food to small birds, and young chickens: its tender shoots and leaves, when boiled, can be scarcely distinguished from early spinach, and are in every respect as wholesome. They are reputed to be refrigerating and nutritive food for persons of a consumptive habit.

CHILBLAIN, in medicine, is a small tumor, or ulcer, in the hands, feet, heels, &c. It is occasioned either by exposing warm parts too suddenly to a cold temperature; or by holding the hands, or feet, when extremely cold, too precipitately to a considerable degree of heat. Such affections always have a great tendency to mortification, in which they frequently terminate.

Children of sanguine habits, and delicate constitutions, are most liable to chilblains; which may be prevented by such remedies as invigorate the system; by wearing flannel socks, from the beginning of September to the latter part of spring, and occasionally taking gentle laxatives, when they are disposed to become costive. All these precautions, however, will be attended with no benefit, if young people are suffered to repair to the fire, immediately after coming from the most severe external cold.

In the commencement of this painful complaint, the cure is easy: immerse the part affected, several times a day, for a few minutes, into cold water, and guard against sudden vicissitudes of heat and cold; as either are equally hurtful. But, if simple water procure no speedy relief, dissolve an ounce of salt-petre in half a pint of vinegar and an equal quantity of water, and foment with it the part affected every night. When the tumors will not yield to these applications, and still remain in a swelled and painful state, without producing ulceration, a few drops of the pure tincture of *benzoin* may be rubbed occasionally on them; and the parts should be defended against the external air, by soft linen cloths: from this simple treatment, we have experienced the best effects.

CHILD, a term of relation to parent; but also metaphorically applied to adults, expressing either simplicity, or imbecility. We shall consider it only in the former sense.

As the *physical education* of *children*, in its different branches, would require a greater portion of room, than can be devoted to it in an alphabetical work; and as this subject has been amply discussed in a work, just published from the German of Dr. STRUVE, we shall, in this place, give a few hints, relative to the *moral* duties of children to their parents. Having incidentally treated of various subjects, not less connected with the bodily prosperity of youth, than that of adults, and resuming others in alphabetical order, we venture to hope, our readers will approve of this arrangement.

The obligations of children to their parents, arise from a principle of natural justice and retribution. To those who gave us existence, we instinctively owe submission, and obedience, during our minority, as well as gratitude and reverence ever after; those who protected us in the weak state of infancy, are justly entitled to our protection in the infirmity of their age: those who, by nurture and education, have enabled their offspring to prosper, ought reciprocally to be supported by that offspring, if unfortunately they should stand in need of assistance. Upon this self-evident principle are established all the filial duties enjoined by positive laws. And, although by the statutes of this country, an *illegitimate* child appears to be exempt from such obligations towards its parent; yet we find, that, in cases of *legal* issue, the tie of nature is not dissolved by any misconduct of the parent; and consequently a child ought equally to defend the person, or maintain the cause, or suit, of a bad parent, as of a virtuous one; and is alike compellable, if of sufficient ability, to maintain and provide for a wicked and unnatural progenitor, as for one who has shewn the greatest affection, and parental piety.—It does not behove us to comment upon the consequences of these injunctions, nor shall we attempt to reconcile them to general principles of equity, but submit this arduous task to the wisdom of our legislators.

With respect to the management of children, in the early stages of life, we refer to the article INFANCY.

CHIMNEY, in building, is that part of a house, where the fire is made, and which is provided with a tube, or funnel, to carry off the smoke.

Notwithstanding the magnificence of the Grecian and Roman architecture, it is very doubtful whether their common dwelling-houses had chimnies; for they made use both of stoves, and holes cut in the roofs of their houses, to admit the free egress of smoke. But as VIRGIL mentions chimnies, we may infer, that they were not wholly unknown to the ancients.

Method of Building Chimnies, that will not smoke: Masons have adopted different methods of drawing up the funnels of chimnies, generally regulated by their own fancy and judgment, which are often influenced by local customs: hence they are seldom directed by sound and rational principles. It frequently happens, that the smoking of chimnies is occasioned by their being carried up narrower at the top than below, or in a zig-zag form, or in angles; indeed, in some instances, this is owing to accidental causes; but, for the most part, it must be attributed to those above mentioned. When chimnies are constructed in a pyramidal or tapering form, especially if the house be of a considerable height, there is much reason to apprehend that they will smoke: the air of a room being rarefied, is forced into the funnel of the chimney, and receives from the fire an additional impetus to carry up the smoke. Thus it is evident that, as the smoke ascends, the impelling force is lessened; it moves slower, and consequently requires a greater proportion of space to circulate through; whereas, in the usual way, it has less room, from the sides of the chimney being gradually contracted.

Although this method of constructing chimnies may not meet with general approbation, because it is supposed that the wider a chimney is at the top, the more liberty the wind has to blow down; yet, on the other hand, it is obvious that, from the structure of the chimney, and from other causes, the wind, having no resistance to overcome, must necessarily return, and thus facilitate the free egress of the smoke. In the usual manner of building pyramidal chimnies, when a current of air rushes downwards, the wind and smoke are in a manner confined, and as the resistance is less from below, the smoke bursts out into the room. Hence the reverse method before suggested, has proved effectual, after every other expedient had failed, and even in a house, standing in the most disadvantageous situation, namely, under a lofty mountain to the southward, from which blasts were blown down upon it. A vent was carried up without angles, as perpendicular as possible, being made several inches wider at the top than at the bottom: the funnel was contracted in a throat directly above the fire-place, and widened gradually upwards. Since that time, the house has not only ceased to smoke, but, when the doors stand open, the draught is so strong that it will carry a piece of paper up to the top of the chimney. The advantage of erecting chimnies after this mode, are so evident, that we venture strongly to recommend its adoption; for, independently of their being exempt from smoking, and contributing to purify the atmosphere, by the rapid current of air continually circulating through the apartment, it will prevent large quantities of soot from accumulating, and consequently remove every apprehension of their taking fire.

Various other experiments have been made, with a view to prevent or cure smoky chimnies: of these we shall enumerate only the two following, which deserve particular notice. The first is, not to suffer the height of the mantle to exceed one-third of that of the room, and to carry the jaumbs and breast upright, at least to the ceiling, when they should be turned or sloped as easily and gradually as possible. The jaumbs from the hearth to the mantle should describe the form of a curve; and the lower part of the mantle, a broad horizontal plane: the distance from the inside of the breast to the back, on each side of the throat, being from ten to fourteen or sixteen inches, according to the size of the chimney. This mode of reducing smoky chimnies, we are informed, has repeatedly been found successful.

Another method, which is attended with but little expence, consists in setting the grate, if a Bath stove, eleven or twelve inches distant from the fender; and in cutting away the back of the chimney, so as to leave a space of two inches between the back of the grate, and that of the chimney. If the grate be of the common form, the sides should be filled up with brick-work, and faced with Dutch tiles. By this construction, the air that passes behind the back of the grate will impel the smoke with an increased velocity, and thus prevent it from bursting into the room.

Smoky chimnies are frequently occasioned by their being so very narrow as scarcely to admit the children, usually employed for the purpose of sweeping them, to reach properly to the top. This evil may be remedied, and that inhuman practice rendered unnecessary, by adopting the following mode, which has been used for time immemorial in Edinburgh, Glasgow, and other cities in the North; and which effectually answers the end intended.

Procure a rope for the purpose, twice the length of the height of the chimney, to the middle of which is to be tied a bush (of broom, furze, &c.) sufficiently large to fill the chimney. Put one end of the rope down the whole passage; and, if there be any windings in it, a bullet, or round stone, is to be tied to the extremity of the rope, and the wood-end of the bush introduced after the rope has descended into the chamber, where a person must pull it downward. By the elasticity of its twigs, the bush sweeps the sides of the chimney as it descends, and carries the soot with it. Should it be necessary for the man at the top, who has hold of the other end of the rope, to draw the bush up again, the person below must turn the latter, so as to send the wood-end uppermost, before he gives notice to the assistant at the top to pull it upwards. Chimnies thus cleaned, never require one-tenth part of the repairs, rendered necessary where they are swept by children: for, as these are obliged to work themselves up, by pressing their knees and feet on one side, and their backs on the other, they not unfrequently force out the bricks that divide the chimnies. This is the chief cause why, in many houses of the metropolis, a fire in one apartment always fills the adjoining ones with smoke, and sometimes even the neighbouring house. *Whole buildings* have often *been burnt down*, from this concealed cause; as a foul chimney, taking fire, communicates it by these apertures to empty apartments, or to such as were filled with lumber; and in which it was thought unnecessary to make any search, after the fire had been extinguished in the chimney where it first began. We, therefore, seriously recommend this practice to be universally adopted, as an object of interest, not less than on account of its humane tendency. It would, farther, be no detriment to those who procure their subsistence by the sweeping of chimnies: for, if this plan should be countenanced, they would be as necessary, then, for the convenience of the public as they are at present; and those very persons would be unavoidably induced to provide themselves with ropes for that purpose. Lastly, such a beneficial change might afford the only practicable means of rescuing many unfortunate children from their degraded situation; prevent many accidents by which they become deformed; and obviate the evils attendant on a premature old age.

Among the treatises published on this subject, besides those contained in Count Rumford's *Experimental Essays*, we shall mention only Mr. David Porter's *Considerations on the present State of Chimney-sweepers*, published some years since; and Mr. Tho. Danforth's pamphlet, entitled *The Theory of Chimnies and Fire-places investigated, &c.* (8vo. 1s. 1796.) The latter is an ingenious, but the former is a practical and valuable essay, which, together with another on the same subject, Mr. Porter has printed at his own expence, and distributed *gratis* for the benefit of the public; a liberality not common to authors.

China: See Porcelain.

CHINCOUGH, or Hooping-cough, a contagious disease, which at first resembles a common cold, though it is from its commencement attended with a difficulty of breathing; and the eyes are protruded from their sockets. It generally attacks children; to whom, if mismanaged, it frequently proves fatal. Those who breathe an impure air, live upon poor sustenance, or are indulged in large potations of warm tea, and do not enjoy sufficient exercise, are most subject to this convulsive cough, in its utmost severity. Hence the necessity of parents to pay unremitting attention to those circumstances which aggravate the complaint.—But, if the cough become so violent that respiration is occasionally suspended, and when the patient breathes again, is accompanied with a shrill hooping noise, no time should be lost to remove him to a different air, whether it be more or less pure, provided it is at some distance from his former residence. The diet in this disorder should always be light, but nourishing; and if no fever prevail, white meat may be allowed in very moderate quantities, so as to divide the usual dinner into three or four different portions, and to give neither cold nor hot drinks, but toast and water, with a little white wine, of which the chill is taken off; gruel; decoctions of sago, tapioca, arrow-root, &c. If the cough be attended with febrile symptoms, medical advice should be procured; but in ordinary cases we would advise a gentle emetic, made of an infusion of chamomile flowers, gradually administered; and afterwards to apply the following liniment to the pit of the stomach: Take one scruple of tartar emetic, dissolve it in two ounces of spring water, and add half an ounce of the tincture of cantharides. This embrocation was originally prescribed by Doctor Struve, and has, from experience, been found of superior efficacy to the patent or quack medicines advertised in the daily papers. A tea-spoonful of it ought every hour to be rubbed on the lower region of the stomach, with a warm piece of flannel; and the wetted part should likewise be covered with flannel. A gentle previous vomiting, however, is necessary to promote the absorption of the liniment.

In the beginning of the hooping-cough, especially after a change of air, great advantage has often been derived from the application of the juice of onions, horse-radish, or other stimulants, to the soles of the feet.—See Blister.

Chlorosis. See Green Sickness.

CHOCOLATE, in commerce, a kind of cake, prepared principally of the nuts of the cacao, or Cocoa-tree, to which we refer.

In preparing these cakes, the cocoa is properly roasted, and well cleaned, before it is pounded in a mortar to reduce it to a coarse mass, which is afterwards ground as fine as possible on a stone. As soon as it is sufficiently triturated, it is put quite hot into tin moulds, where it congeals in a very short time.—This is the common chocolate, as prepared in England from the cocoa alone, without any other ingredient. Sometimes, however, a small quantity of sugar, or of vanilla, is added, for improving its taste. As these cakes are very liable to contract good as well as bad scents, they should be carefully wrapped up in paper, and kept in a dry place.

Good, unadulterated chocolate, ought to possess the following properties: a brown colour inclining to red, and rather lively than faint; a smooth surface not affected by mere contact of the hand; a fine and uniform consistence on breaking it, without any granulated particles, which arise from the addition of sugar, employed by the manufacturer to conceal still baser ingredients; lastly, it should easily melt in the mouth, and leave no roughness or astringency, but rather a cooling sensation on the tongue.—This last quality is the most decisive criterion of genuine chocolate.

Among the various experiments made with the view of discovering substitutes for the expensive nut of the cocoa, in the preparation of chocolate, none has hitherto *completely* succeeded. The Germans employ sweet almonds, as well as the blanched, dried, and roasted kernels of the hazel, and wall-nut, for this purpose; and M. MARGRAFF procured a quantity of oil from the fruit, or kernel, of the lime-tree, which he formed into a paste, resembling chocolate, but it differed much from it, both in taste and flavour.

Chocolate, ready made, and cocoa-paste, are prohibited to be imported, on penalty of forfeiting the same, and double the value: 10 GEO. I. c. 10, sec. 2.—We understand, from the "*Encyclopædia Britannica*," though we cannot find it in "*Steel's Tables of the Custom and Excise Duties*," that chocolate, made and sold in Great Britain, pays an inland duty of 1s. 6d. per lb. avoirdupois; that it must be inclosed in papers, containing one pound each, and produced at the excise office, to be stamped.—(It is, nevertheless, generally sold in papers, containing four ounces each.) — On giving three days notice to the excise, private families may make their own chocolate, provided not less than half an hundred weight of nuts, be employed at one time.

Considered as an article of diet, chocolate is a nutritive and, in general, wholesome food, well adapted to the weak stomachs of invalids and valetudinarians. If duly prepared, and not too much roasted in the nuts (which imparts a dark, rather than reddish colour to the cakes), it is easily dissolved in a liquid state; and, being quickly assimilated to alimentary matter, it is less flatulent, and oppressive, than most vegetable dishes of a viscid, and oily nature. To promote its digestion, it ought not to be used without the addition of aromatic spice, such as cinnamon, cardamoms, vanilla, &c. which last, however, must be sparingly employed, as it is one of the most heating, and stimulating drugs.

Cholera Morbus. See DIARRHŒA and VOMITING.

CHRISTOPHER, the HERB, or *Actæa spicata,* L. is an indigenous plant, growing in woods and shady places, and is found chiefly near Malham-Cove, Clapham, Thorpe Arch, and other places in the north-west of Yorkshire. It is perennial, attains the height of about 2½ feet; flowers in the months of May, or June; and produces black, shining, pulpy berries in autumn, about the size of peas, which are considered as poisonous.

On account of its fetid smell, this plant is said to be frequented by toads: it is, nevertheless, eaten by sheep and goats, but refused by cows, horses, and swine. The dry leaves are extremely sharp and rough, so that they may be usefully employed for polishing hard wood and ivory. — The berries, boiled with alum, yield a deep, black dye; and THIELBEIN, a German writer (in CRELL's "*Chemical Discoveries,* vol. ii.), asserts that the *red* berries of the *Actæa spicata,* give a beautiful dye, equal to that obtained from cochineal; after boiling them with cream of tartar, and dropping into the decoction a solution of tin in aqua fortis, the colour became permanent.—We believe he alludes to the berries produced by another species of this herb, either the *Actæa alba,* or *racemosa* of North America, or the *cimicifuga,* of Siberia (which is an excellent preservative against the worm in paper, moths, and bugs); because our native species generally produces *black* berries.

CHRONICAL DISEASES are, in general, neither attended with fever, nor any other symptoms portending a speedy termination of the complaint; and, in this sense, they are opposed to *acute,* or inflammatory disorders. Physicians find no small difficulty in drawing a precise line of distinction between these affections; as the latter often change into those of a *chronic* nature.

TISSOT derives the origin of inveterate diseases from the following sources: 1. Debility of the solid parts of the body, either hereditary, or induced by adventitious causes; 2. Defective digestion, and weakness in the stomach; 3. improper treatment, and imperfect resolution, of acute diseases; and 4. Too great irritability, and other affections, of the nervous system.

From this view of the *causes,* and the corresponding evidence of medical practitioners, it cannot be doubted that chronic maladies are not only the most complicated, but also the most difficult to be removed: Proteus-like, they appear under a thousand different forms, often exhaust the fortitude of the most patient, baffle the united efforts of the Faculty, throw the unhappy person into a state of despair, and deliver him over to all the artifices, and cunning of ignorant pretenders, who impose upon the credulous victim, and close the scene of his delusion!

On the contrary, in acute diseases, Nature, though violent in all her efforts, generally points out the way, in which she *may* be assisted: in short, the *cautious* physician, who has had a moderate share of experience, will here seldom fail to procure the desired relief. If his prescriptions be scrupulously attended to, a few appropriate doses, in a vigorous constitution, will produce all the good effects which may be attained by art.—But, in chronic affections, medicines generally operate slowly, and often in a manner very different from what experience entitles us to expect. Hence the precarious nature of *drugs* has become almost proverbial; not because they are in themselves inert (which would involve a contradiction); but because they were improperly, or injudiciously, applied.

Such being the case in all those inveterate affections, which torment mankind, it is matter of just surprize, that the attention of the afflicted, as well as the scientific, has not been more generally directed towards discovering effectual means of relieving the unhappy, instead of such as have but too often eluded the most sanguine hopes of the patient, and detracted from the reputation of the physician.—If it be admitted that, in chronic distempers, the whole animal frame is under a *slow*, though certain, influence of disease; that the system, in all its functions, requires a very different action, or stimulus, from that generally produced by *medicines*, on particular organs; and that so favourable a change can be effected only by operating on the different processes of digestion, assimilation, absorption, and respiration, not *separately*, but *conjointly*; then we may venture to affirm, that the *prevailing* plan of treating those obstinate maladies is established upon a very precarious basis.

Novel as this assertion may appear to many of our readers, it is nevertheless *true*; and though it may, at first, meet with opposition, like most of those general truths which all acknowledge, but few will defend or practise, there is every reason to trust to the good sense of mankind, that empiricism and knavery will *gradually* vanish from the tablets of history.

In order to approach with our labours towards a plan of so beneficial a tendency, we have, on all proper occasions, inculcated the necessity of attending to that most important department of medicine, which treats of *diet* and *regimen*. From these *alone*, the most essential advantages may be derived in ALL chronic diseases, especially such as cannot be traced to their *sources*, or the *predisposing* causes of which cannot be discovered, either from an intentional concealment of the patient, his want of resolution and capacity to disclose them, or other reasons, chiefly arising from the present imperfect state of the healing art. Hence, the writer of this article has, for many years, been sedulously employed in collecting and arranging facts, towards a new work, in which he proposes to lay before the public an outline of the treatment to be adopted in a diseased state of the body; and which will form a counterpart to his former "*Lectures on Diet and Regimen*."—At present, it will be sufficient to point out the principal rules, by which the conduct of such persons, as are the victims of inveterate afflictions, ought in general to be guided.

1. When the patient is not confined to his bed, *gentle* and *frequent exercise* will be salutary; but all violent commotions, whether of mind or body, are extremely prejudicial, and cannot fail to retard his recovery.

2. The sick-room ought to be lofty and capacious, frequently ventilated by opening the door or windows, without admitting a draught of air; and, in damp weather, the

apartment cleared of foul, mephitic vapours, either by mild aromatic fumigations, or more effectually, by the steam of vinegar. For the same reason, all soiled linen, as well as the night-chair, &c. should be immediately removed; the bed frequently made; and an assemblage of persons never suffered to vitiate the atmosphere of a patient's room.

3. Let the *temperature* of the air be *cool* rather than warm; yet this general rule may admit of exceptions in particular cases: only a moderate degree of warmth should, likewise, be allowed with respect to the bed-clothes, and especially the covering, which ought to be soft and light. When the strength of the patient permits, he should be encouraged to rise, and spend part of the day, sitting either in bed or on a chair; but carefully avoiding a draught of air, or taking cold: hence he should not too suddenly venture to leave the house.

4. In regard to *food*, he must abstain from crude and heating animal flesh, such as bacon, ham, boiled beef, hard eggs, &c. from dry, flatulent, acrid, salted, and such provisions as increase the bulk of feculent excretions. Thus, white meat in the most frugal portions, blended with vegetables of a mucilaginous and nutritive kind, such as cauliflower, asparagus, parsnips, scorzonera, &c. as well as light dishes of rice, barley, or oatmeal, in a liquid rather than solid form, and particularly baked or roasted apples, will be found the most conducive to health. In certain cases, however, raw fruit may be abundantly allowed; but the patient must never eat any food against his appetite; and if, during the crisis of a disease, he should express a strong desire for a particular dish, no prudent physician will object to the gratifying of this natural inclination, unless the substance claimed be obviously possessed of hurtful qualities.

5. In the article of *drink*, a chronic patient cannot be too cautious. In general, he ought to give the preference to simple, pure water, or ptisan made of pearl-barley and currants; or whey; toast and water; or this fluid acidulated with the juice of lemons or vinegar, and sweetened with sugar or honey. All spirituous liquors are, in general, unnecessary and detrimental, unless required from particular circumstances.

6. The important process of *perspiration* also deserves to be duly regulated: every time the patient has profusely perspired, he ought to change his linen, which should be previously warmed; and, if there prevail no peculiar irritability in the system, flannel will always be found the most beneficial dress next the skin.

In short, every object, tending to alarm or disturb the patient, should be carefully removed; his sleep rendered as quiet and comfortable as possible; and, if his strength and appetite begin to improve, he ought to redouble his attention, both as to the time and manner of taking muscular exercise, not less than to his mental exertions, as well as with regard to the gradual change of the quantity and quality of his aliment.

CHRYSALIS, or AURELIA, in natural history, is a term expressing that form of butterflies, moths, chafers, and other insects which they assume, while in a state of rest and apparent insensibility; before they arrive at their winged or most perfect state. This transformation, says Herder, a celebrated German author, affords a beautiful emblem of man's passage to a future life.

The form of the chrysalis generally approaches that of a cone: while the creature is in this state, it appears to be destitute both of legs and wings, to have scarcely power to move; and, in short, to be almost devoid of life. It takes no nourishment, nor has it indeed any organs for that purpose: its posterior part is all that seems animated, which has the power of motion, in a very slight degree. The external coat of the chrysalis is cartilaginous, of a considerable size, generally smooth and glossy, though some of them have a few hairs, while others are as hairy as the caterpillars from which they are produced; and again others are rough, and in a manner shagreened.

When first produced, the chrysalis is soft, and the front of it moistened with a viscous liquor, which surrounds the wings, legs, &c. as it hardens almost immediately, all those limbs that were before separated, are consolidated into a mass. Having undergone its change, in this state, it perforates the shell with its head, and bursts forth into day, in its winged form. See Butterfly.

As this admirable part of the animal creation has, hitherto, been almost entirely neglected by economists, though it has always excited the attention of the curious naturalist, we have inserted the preceding concise account, to remind the ingenious inquirer, that even these apparently useless creatures may, perhaps, at some future time, become subservient to important purposes.—See Caterpillar, p. 456.

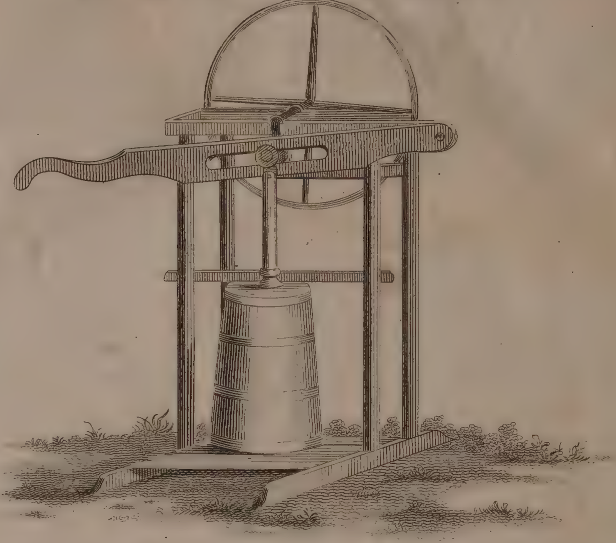
CHUB, or *Cephalus*, L. is a species of the *Cyprinus*, a numerous genus of fish. It is mostly found in holes overshadowed by trees, where these fish are seen floating during warm weather, in great numbers.

Chub, being very full of bones, afford but an indifferent dish; yet they furnish considerable amusement to anglers, as they may be easily taken. The best mode of fishing for them is the following: Prepare a very strong rod of sufficient length, and fix to the hook a grasshopper, beetle, or any other large fly. This must be dropped gently at a small distance from the fish, which will bite immediately, if it does not see the angler, who should take the precaution of concealing himself from it; as, being extremely timid, this fish sinks to the bottom, on the slightest alarm, and not unfrequently at the passing of a shadow. In March and April, it may be caught with large, red worms; in June and July with flies, snails, and cherries; but in the months of August and September, the proper bait is good cheese pounded in a mortar with some saffron, and a small quantity of butter. The best season for this fish is winter, as the flesh is then more firm, and better tasted. During cold weather, the angler should keep his bait at the bottom, when it will be eagerly seized.

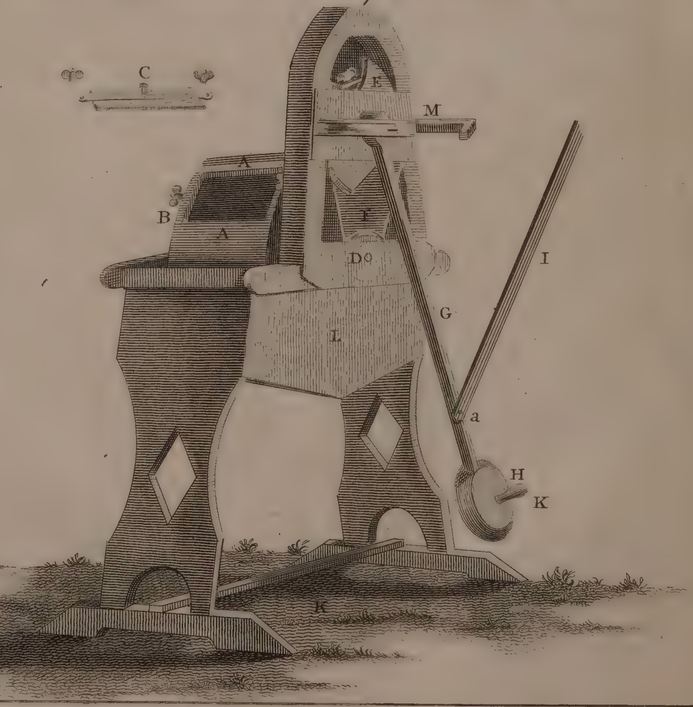
CHURN, a vessel in which butter, by long and violent agitation, is separated from the serous part of milk.

The inferiority of the churns in common use, has induced several ingenious mechanics to exert their skill in contriving others, that would render the process of making butter less tedious and expensive. Of these

Mr. C. Harland's Churn.



Mr. W. Bowler's improved Churn.



these, we shall give a succinct account.

The *first* is an improved butter churn, constructed on a new principle, by the ingenious Mr. C. HARLAND, of Fenchurch-street, London.

The BARREL CHURN, delineated in the Plate annexed, is moved by the intervention of a multiplying wheel, to moderate its too violent motion. The head of the crank in the mortise (in the handle) effects the rotatory motion of the barrel with great facility. And, if the barrel be *fixed*, and the axis (in the inside), to which the dashers are attached, be made to *turn*, the butter will be more speedily formed. A fly-wheel is also affixed, by means of which the agitation of the cream is necessarily performed in a more uniform manner; and, consequently, the butter will be more perfectly separated from the whey.

The *second* is Mr. WILLIAM BOWLER's improved CHURN, for which the Society for the Encouragement of Arts, Manufactures, and Commerce, liberally gave him thirty guineas, in the year 1795.

This churn is of the barrel kind, being a cylinder, 18 inches in diameter, and 9 wide; the sides are of wood, and the rim a tin plate, which has two openings; one 8½ inches in length, and 4 in width, through which the cream is poured into the churn, and the hand introduced for cleaning it; the other, a short pipe, one inch in diameter, by which the butter-milk runs out of the churn, when the operation is finished. The first of these openings has a wooden cover, fastened down by two screws; and the other a cork fitted to it, while the butter is churning. There is farther, near the larger opening, a small vent-hole with a peg, to admit the passage of any air that may be discharged from the cream, at the beginning of the operation. An axle also passes through the churn, terminating in two gudgeons, on which it hangs; its lower part being immersed in a trough, in order to hold occasionally either hot or cold water, according to the season of the year. On the inside of the rim, are four projecting pieces of wood, with holes, serving to agitate the cream by the motion of the churn. This movement is caused by a pendulum 3 feet 6 inches long, that has an iron bob, weighing 10lbs. and at its upper end a turning pulley, 10 inches in diameter, from which a rope goes twice round another pulley about 3 inches in diameter, fixed on the axis of the churn, which it causes to make a partial revolution, by each vibration of the pendulum.

There are likewise sliding covers to the machinery, and also another to the water trough; in order, when hot water is used, to secure the steam, and keep the cream in a proper degree of warmth. The motion of the pendulum is given, and continued, by means of a wooden rod, about 3 feet 9 inches in length, which turns on a pin 3 inches above the bob of the pendulum.

Explanation of the Engraving which represents Mr. William Bowler's improved Churn.

A. A. The body of the churn.

B. An opening, by which the cream is put in.

C. The cover of the large opening. The small hole on the opposite side cannot be delineated in the print.

D. The axis, or gudgeon, on which the body of the churn is suspended.

E. The upper, or large pulley.

F. The smaller pulley fixed on the axis of the churn.

G. G. The rod of the pendulum, hanging from the upper pulley E.

H. The bob of the pendulum.

I. I. The handle, moveable on the pin at *a*, by which the pendulum is moved, making a traverse in the form of the dotted line K. K.

L. The trough for the hot or cold water.

M. A projecting piece of wood, with a shoulder, which supports the handle I. when the churn is not at work.

As butter is often made in small quantities, and the vertical motion of the common churn is extremely fatiguing, we consider those methods of applying the powers of mechanism, as valuable improvements. Hence we presume to recommend the preceding improved butter-churns to be generally introduced; for the facility and expedition, with which butter is thus obtained, will amply compensate the additional expence.

Churning. As we have already discussed the subject of butter, and treated of the management of the dairy as connected with it, we shall only offer here a few supplementary remarks.

If a pump-churn be employed, it may be plunged a foot deep in a tub of cold water, and remain there during the whole time of churning; which will harden the butter in a considerable degree. This operation, as we have before observed (p. 403), may be much facilitated, by pouring into the churn a small quantity of distilled vinegar, which will produce butter in the course of one hour. Those who make use of a pump-churn, should endeavour to keep up a regular motion of the machine; and by no means admit any person to assist them, unless from absolute necessity: for, if the churning be irregularly performed, the butter will in winter *go back*; and, if the agitation be more quick and violent in summer, it will cause the butter to ferment, and thus to acquire a very disagreeable flavour. —Where there are many cows, a barrel-churn is preferred; but unless it be kept very clean, the bad effects of it will be soon discovered in the butter. Particular care should also be taken, to place it in a proper temperature, according to the change of the season; that is, to fix it in a warmer situation in the winter; and, in the summer, to expose it to a free current of air.

Churn-Staff. See Wart-wort.

CHYLE, in animal economy, is that white fluid, produced from the nutritious part of the food, in the first passages, after the fibrous or feculent matter has been separated: it is chiefly generated in the milk-vessels of the mesentery, whence it passes to the receptacle of the chyle, situated under the left kidney, and is conveyed to what is called the thoracic duct, or the canal of the chest, from which it enters certain veins, where it is mixed with the *blood*; in short, it is the only supply of that *vital* fluid, and hence the great importance of wholesome food, from which alone a salubrious blood can be prepared, will be easily conceived. In this view only, we have introduced the word *chyle*: a liquor which resembles milk; has a sweetish-saline taste; easily coagulates; and consists of a mixture of oily, watery, and lymphatic parts (see Lymph); its milky colour arises from the combination of oil with water; an instance of which occurs in the milk of almonds.

As the chyle is, by Nature, intended to form the blood, to supply the body with nutritious juices for the daily loss and waste it sustains, it is obvious that this salutary process ought not to be interrupted by violent exercise after meals; because the chyle is supposed not to be completely secreted, till about four hours after the food has been taken.

Dr. DARWIN observes that, tho' the chyle, from different kinds of aliment, is very similar, and all the various constituent parts of animal bodies are ultimately produced from the chyle, by sanguification and secretion, yet it happens, that some kinds of aliment possess a greater quantity of these particles, than others: such materials, for instance, as already contain much sugar, mucilage, and oil, as the flesh of dead animals, or the fruits and seeds of vegetables.

CICELY, the SWEET, or great chervil, or shepherd's needle, the *Scandix odorata*, L. is a native plant, growing in orchards, hedges, and waste places, but generally near houses; and is chiefly found in the counties of Westmoreland, Cumberland, Lancaster, and Worcester. It is perennial, produces white flowers, which blow in the month of May or June, and seeds of a sweet and agreeable taste. The whole plant has an aromatic scent, and its seeds are used in the north of England, for polishing and perfuming oak-floors, and furniture: they also yield an essential oil, similar to that obtained from anise-seeds.—The fresh leaves and stalks of the sweet cicely impart to wool a fine citron yellow dye, when prepared in a solution of bismuth; as asserted by DAMBOURNEY.

CICHORY. See Wild SUCCORY.

CINNABAR, in natural history, is either native, or factitious. The former is an ore of quicksilver, moderately compact, very heavy, and of a beautiful striated, red colour. The latter is composed of six, or eight parts of mercury, to one of sulphur; the whole is sublimed, and thus reduced into a fine, red glebe. The best is of a high colour, and full of fibres, resembling needles: the chief use of cinnabar is for painting.

Formerly, the native cinnabar was much employed in medicine, as a sedative and antispasmodic powder, which is still vended in Germany, for the use of the ignorant, who take a dose of it after every alarm, or fright. But as this metallic substance contains arsenical particles, of which it cannot be cleared by repeated ablution, it frequently occasions nausea, trembling, and anxiety; which, however, subside after vomiting.—We should not have mentioned this substance, had we not learnt from a pamphlet, published by Dr. LETTSOM, that a late famous Quack (whose son and widow now contend in the newspapers, for the authenticity of his prescriptions; and still trifle with the lives of unwary persons), administered the native cinnabar, in *red powders*, of which he kept *six* kinds, containing different proportions of this *pigment*, in order to deceive the patients by a greater variety of colours.—When will this outrage on humanity terminate?

CINNAMON, is the bark of the true cinnamon tree, or *Laurus cinnamomum*, L.—but an inferior sort, which is often sold for genuine,

nuine, is collected from the base cinnamon, or *Laurus Cassia*, L. See BAY-TREE, p. 201.

Cinnamon is one of the most agreeable, and useful aromatics: it is more grateful both to the palate and stomach, than the generality of spices. It cannot, however, be doubted, that it is more heating and stimulating, than its common substitute, cassia-bark: hence the latter is better adapted to culinary uses, especially for the young and plethoric, than the real cinnamon, which deserves the preference in medicine: and here it is of considerable service in alvine fluxes, arising from relaxation, and other immoderate discharges.

CINQUEFOIL, or, *Potentilla*, L. a genus of plants, comprising thirty-five species, of which only eight are indigenous; the principal of these are: 1. The *fruticosa*, or shrubby cinquefoil, which is set with fine silvery hairs, has reddish stems, and yellow blossoms, that appear in the month of June: the flowers are conspicuous for their number and beauty.

This plant has been usefully employed on the Continent, in tanning calf-skins; and it is also eaten by cows, horses, goats, and sheep; but is refused by hogs.

2. The *anserina*, or wild tansey, or goose-grass. See SILVER-WEED.

3. The *argentea*, or hoary cinquefoil, which grows on meadows and pastures, in a gravelly soil, and flowers in June.—The whole may be used for tanning, and dyeing black colours; as it is not touched by cattle.—BECHSTEIN.

4. The *reptans*, or common creeping cinquefoil, which grows in a moist, clayey soil of meadows, pastures, and by road-sides. It is perennial, and flowers from June to August.—A fine-grained calf-leather has, likewise, been prepared from this plant, on the Continent.—The red cortical part of the root is mildly astringent, and antiseptic: a decoction of it has been found an excellent gargle for loose teeth, and spongy gums.

CINQUEFOIL, the MARSH. See Purple MARSHLOCKS.

CIRCULATION. See TRANSFUSION.

CISTERNS are vessels employed for the reception of rain, or other water, either under ground, such as those of navigable canals, &c. or above ground, for domestic and other purposes. In this place, we shall treat only of the latter.

As the water collected in leaden cisterns is apt to corrupt, either by stagnating for several days, when the pipes happen to be obstructed, or by the deposition of feculent matter, as well as the incrustation formed in such vessels, it follows that they ought to be frequently cleansed of the copious sediment they contain. This attention is the more necessary, as *lead* is a metal liable to be dissolved by acids; and, in that state, proves a slow, but fatal poison. Although the acidity contained in stagnant water which has, in its course, been impregnated with animal and vegetable particles, cannot be very considerable, yet it will be more safe, and prudent, to prevent the formation of such acids, by an early attention to the purity of the water. See FILTRATION.

END OF VOL. I.

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